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# PROCEEDINGS OF CONFERENCE ON POLLUTION OF THE NAVIGABLE WATERS OF THE PENOBSCOT RIVER AND UPPER PENOBSCOT BAY AND THEIR TRIBUTARIES, HELD IN BELFAST, MAINE, 20 APRIL 1967

Federal Water Pollution Control Administration
Washington, D. C.

20 April 1967

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* * *

Conference in the Matter of Pollution of the Navigable Waters of the Penobscot River and Upper Penobscot Bay in the State of Maine, held at the Belfast High School, Belfast, Maine, on Thursday, April 20, 1967, at 9:45 a.m.

PRESIDING:

Mr. Murray Stein, Assistant Commissioner for Enforcement, Federal Water Pollution Control Administration, Department of the Interior.

CONFEREES:

Lester M. Klashman, Regional Director, Northeast Regional Office, Federal Water Pollution Control Administration

Raeburn W. Macdonald, Chief Engineer, Maine Water Improvement Commission

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PARTICIPANTS:

Herbert Pahren, Deputy Regional Director, Federal Water Pollution Control Administration, Department of the Interior, Boston, Massachusetts

Mark Abelson, Regional Coordinator, United States Department of the Interior

Richard E. Griffith, Regional Director, Bureau of Sport Fisheries and Wildlife, Department of the Interior

John E. Ronkoski, Area Coordinator, Department of Housing and Urban Development

Charles Larson, Regional Shellfish Consultant, United States Public Health Service, Boston, Massachusetts

Robert L. Dow, Research Director, Department of Sea and Shore Fisheries of the State of Maine

Fred G. Buzen, General Manager, Penobscot Poultry Company, Belfast, Maine

Frederick B. Young, Lobster Fisherman

Joseph F. Swink, Second Selectman, Town of Castine, Maine

James A. Lyle, Public Works Officer, Maine Maritime Academy, Castine, Maine

Steven Glass, Plant Manager, Maplewood Packing Company, Belfast, Maine

David F. Pollard, Resident Manager, St. Regis Paper Company, Bucksport, Maine

PARTICIPANTS (Continued):

Edwin E. Geldreich, Microbiologist, Cincinnati Water Research Laboratory, Federal Water Pollution Control Administration, Department of the Interior, Cincinnati, Ohio

E. Horton Girdler, Resident Manager, Eastern Fine Paper and Pulp Division, Standard Packaging Corporation, Brewer, Maine

Irving Isaacson, Esquire, Representing Maplewood Packing Company

Gridley W. Tarbell, Mayor, City of Belfast, Maine

George Tozer, Project Engineer, Metcalf & Eddy, Engineers for the City of Belfast, Maine

Archie D. Sanborn, Town Manager, Bucksport, Maine

Earle D. Stevens, City Manager, City of Brewer, Maine

Robert W. Rupper, Director of Engineering, Carver-Greenfield Corporation, Summit, New Jersey

Levi Grant, Stockton Springs, Maine

Thomas Jester, Metcalf and Eddy, Engineers for the City of Bulfast, Maine

John P. Jabar, representative of Senator Edmund S. Muskie

Jerome G. Phante, representative of Congressman Peter N. Kyros.

William Jabine, Northport Village Corp. Belfast, Maine

THOSE IN ATTENDANCE:

Mark Abelson, Regional Coordinator, U. S. Department of the Interior, John F. Kennedy Federal Building, Boston, Massachusetts

Randy Adams, Sales, W. H. Shurtleff Co., Parkway South, Brewer, Maine

Wilbur Allen, Divisional Engineer, Penobscot Poultry Company, 155 High Street, Belfast, Maine

Howard Aucherton, Industrial Salesman, R. B. Dunny & Co., Rice Street, Bangor, Maine

Robert E. Baldacci, City Council, Bangor, 82 Palm Street, Bangor, Maine

John E. Bonkoski, Area Coordinator, Department of Housing and Urban Development, Region I, 346 Broadway, New York City

Henry G. Bouchard, Town Manager, Town of Searsport, Maine

Norris D. Braley, 37 Church Street, Belfast, Maine

Louis L. Broudy, Attorney, Standard Packaging Corporation, 200 East 42nd Street, New York, New York 10017

Dr. Everett S. Bryant, Veterinarian, Penobscot Poultry Company, 153 High Street, Belfast, Maine

Fred G. Buzen, General Manager, Penobscot Poultry Company, 163 High Street, Belfast, Maine

THOSE IN ATTENDANCE (Continued):

Floyd J. Carr, Selectman, Stockton Springs, Maine

William S. Carver, President, Fred S. Carver, Inc., One Chatham Road, Summit, New Jersey

Mrs. Clyde R. Chapman, Belfast, Maine

C. A. Chase, Chairman, Planning Board, Castine, Maine

Lew Colony, Member, Water Improvement Commission, Hallowell, Maine

Robert Coose, Digger, Stockton Springs, Maine

Oliver G. Coulling, Superintendent & Engineer, Augusta Sanitary District, 25 Wade Street, Augusta, Maine

Richard L. Crommett, Technical Director, Standard Packaging Corporation, Brewer, Maine

Howard S. Davis, Microbiologist, Merrimack River Project, Federal Water Pollution Control Administration, Watertown, Massachusetts

Robert L. Dow, Research Director, Maine Department of Sea and Shore Fisheries, State House, Augusta, Maine

Bob Drew, Bangor Daily News, Bangor, Maine

Earl F. Dyer, Clam Warden, Lincolnville Beach, Bifford Road, Lincolnville

Richard W. Estabrook, Project Engineer, St. Regis Paper Company, Main Street, Bucksport, Maine

THOSE IN ATTENDANCE (Continued):

John H. Fenton, N. E. Correspondent, New York Times, 300 Harrison Avenue, Boston, Massachusetts

Mrs. John H. Fenton, 140 Chestnut Street, Andover, Massachusetts

Harlow Floyd, Official, Orrington, Maine

Francis X. Forest, 16 Church Street, Belfast, Maine

John H. Foster, Partner, Malcolm Pirnie Engineers, 226 Westchester Avenue, White Plains, New York

Paul J. Fournier, Marine Extension Agent, Sea & Shore Fisheries, Box 555, Bath, Maine

John Frawley, City Engineer, City of Bangor, City Hall, Bangor, Maine

Forest M. French, Town Manager, Town of Orono, Orono, Maine

J. L. Gavaza, Vice President, Maine Reduction Company, Brooks, Maine

Emil G. Garrett, Planning Engineer, Dow AFB, Bangor, Maine

Edwin E. Geldreich, Research Microbiologist, Cincinnati Water Research Laboratory, Federal Water Pollution Control Administration 4676 Columbia Parkway, Cincinnati

E. Horton Girdler, Resident Manager, Standard Packaging Corporation, South Brewer, Maine

THOSE IN ATTENDANCE (Continued):

Steven G. Glass, Manager, Maplewood Poultry Company, Belfast, Maine

Phillip L. Goggins, Laboratory Director, Sea & Shore Fisheries, Boothbay Harbor, Maine

George Gormley, Sanitary Engineer, Maine Water Improvement Commission, State House, Augusta, Maine

J. J. Grady, President, Maine Reduction Company, Inc., Brooks, Maine

Levi M. Grant, Clam Dealer, Stockton Springs, Maine

Milford C. Grant, Clam Digger and Dealer, Stockton Springs, Maine

Richard E. Griffith, Regional Director, Bureau of Sport Fisheries and Wildlife, Boston, Massachusetts

R. H. Hagadorn, Captain, United States Coast Guard, Southwest Harbor, Maine

Lee W. Haines, Chief Sanitary Engineer, Wright, Pierce, Barnes & Wyman, 99 Main Street, Topsham, Maine

Mr. and Mrs. Donald S. Hall, Belfast Women's Club, 211 High Street, Belfast, Maine

Millard W. Hall, Assistant Professor, University of Maine, Department of Civil Engineering, 346 Boardman Hall, Orono, Maine

THOSE IN ATTENDANCE (Continued):

Ralph Hall, Clam Dealer, Stockton Springs, Maine

John M. Harriman, Stockton Springs, Maine

Willard Harriman, Stockton Springs, Maine

Dr. E. R. Hitchner, Member, Maine Water Improvement Commission, Augusta, Maine

J. S. Holmes, Belfast, Maine

Mrs. J. S. Holmes, 21 High Street, Belfast, Maine

N. B. Holmes, Jr., President, Eastern Maine Towage Company, Marshall Wharf, Belfast, Maine

Donald C. Hoxie, State of Maine Department of Health and Welfare, Division of Sanitary Engineering, Augusta, Maine

John W. Hurst, Jr., Marine Resources Scientist, Sea & Shore Fisheries, State of Maine, Boothbay Harbor, Maine

Herbert C. Hutchings, Jr., Penobscot Poultry Company, Belfast, Maine

Irving Isaacson, Attorney, Maplewood Packing Company, 145 Lisbon Street, Lewiston, Maine

John P. Jabar, Maine Representative representing Senator Muskie, Main Street, Waterville, Maine

William Jabine, Northport Village Corporation, Belfast, Maine

Eugene T. Jensen, Chief, Office of Estuarine Studies, Federal Water Pollution Control Administration, Washington, D. C.

THOSE IN ATTENDANCE (Continued):

Thomas L. Jester, Engineer, Metcalf & Eddy, Engineers, Statler Building, Boston, Massachusetts

Alton L. Johnson, Manager-Treasurer, Searsport Water District, Reservoir Street, Searsport, Maine

Malcolm F. Kallus, Eastern Operations Officer, Office of Comprehensive Programs, Federal Water Pollution Control Administration, Washington, D. C.

Earl N. Kari, Director, Washington State Enforcement Project, Federal Water Pollution Control Administration, Portland, Oregon

Edgar G. Keenan, Manager, District Office, R. W. Booker & Associates, Inc., Consulting Engineers, 340 Main Street, Rockland, Maine

Alfred J. Keith, Treasurer, Northport Village Corporation, Belfast, Maine

Edward Keith, 292 Buck Street, Bangor, Maine

Harvey R. Kelley, Editor, Republican Journal, Belfast, Maine

William B. Keswick, Searsport Avenue, Belfast, Maine

F. W. Kittrell, Chief, Technical Advisory and Investigations Activities, Division of Technical Services, Federal Water Pollution Control Administration, Cincinnati, Ohio

THOSE IN ATTENDANCE (Continued):

Dr. R. Stevens Kleinschmidt, P. E., Consulting Engineer, Water Improvement Commission, Pittsfield, Maine

J. E. Kussmann, Assistant Vice President, St. Regis Paper Company, 150 East 42nd Street, New York, New York

Frank Larrabee, Public Relations Manager, St. Regis Paper Company, Bucksport, Maine

Charles D. Larson, Regional Shellfish Consultant, United States Public Health Service, John F. Kennedy Federal Building, Boston, Massachusetts

Guy T. Lewis, Sanitary Engineer, Sewall Company, Coles Corner Road, Winterport, Maine

Rosanne Light, Program Analyst, Division of Enforcement, Federal Water Pollution Control Administration, Washington, D. C.

Mrs. Wallace Lindquist, Camden, Maine

Albert M. Lowe, Manager, Broiler Department, Penobscot Poultry Company, Belfast, Maine

James A. Lyle, Public Works Officer, Maine Maritime Academy, Castine, Maine

Raeburn W. Macdonald, Chief Engineer, Maine Water Improvement Commission, State House, Augusta, Maine

William B. Marshall, Chairman, Belfast Planning Board, City of Belfast, 14 Church Street, Belfast, Maine

THOSE IN ATTENDANCE (Continued):

Cecil S. Matthews, Northport, Maine

William E. Matthews, Director, Research and Planning, Maine Department of Economic Development, State House, Augusta, Maine

Mrs. Charles D. McEvoy, Jr., President, League of Women Voters, 51 Highland Street, Bangor, Maine

James J. McKewon, Regional Engineer, National Council for Stream Improvement, Tufts University, Medford, Massachusetts

Perley A. McNutt, Manager, Belfast Canning Company, Belfast, Maine

James Mendelson, President, Maplewood Poultry Company, Belfast, Maine

Edwin Mitchell, Resources Specialist, Sea & Shore Fisheries, Boothbay Harbor, Maine

Harvey E. Mitchell, Stockton Springs, Maine

Jim Moore, District Correspondent, Portland, Maine, Press Herald, WGAN-TV, Portland, Maine

Leo J. Morency, Member, Maine Water Improvement Commission, Augusta, Maine

Mr. and Mrs. W. B. Oliver, 11 Fernald Road, Orono, Maine

Robert W. Patterson, Member, Presidents' Water Pollution Control Advisory Board, Bar Harbor, Maine

THOSE IN ATTENDANCE (Continued):

Roland Pease, Digger, Searsport, Maine

Charles A. Peirce, Chairman, Waldo County Development Company, Palermo, Maine

Robert E. Perry, Technical Director, Scott Paper, Northeast Division, Winslow, Maine

Jerome G. Phante, Field Representative for Peter N. Kyros, Member of Congress, Field Office, Portland, Maine

Mrs. Rheta B. Piere, Staff Assistant, Division of Enforcement, Federal Water Pollution Control Administration, Washington, D. C.

Carroll Pinkham, Photographer, WLBZ-TV, Bangor, Maine

David F. Pollard, Resident Manager, St. Regis Paper Company, Bucksport, Maine

Judy Poulson, Reporter, Courier-Gazette, One Park Drive, Rockland, Maine

Edward Pride, Jr., Northport, Maine

Kenneth R. Ramsey, News Editor, Republican Journal, High Street, Belfast, Maine

Ellis A. Reeby, City Manager, City of Belfast, City Building, Belfast, Maine

G. B. Reed, Belfast, Maine

Peter G. Rich, Partner, Thompson, Hinckley & Thaxter, 192 Middle Street, Portland, Maine

THOSE IN ATTENDANCE (Continued):

Malcolm E. Richards, Marine Resources Scientist, Maine Sea & Shore Fisheries, Box 21, West Sullivan, Maine

R. W. Ruppert, Director of Engineering, Carver-Greenfield Corporation, One Chatham Road, Summit, New Jersey

Edward A. Ryan, Wright, Pierce, Barnes & Wyman, Engineers, 99 Main Street, Topsham, Maine

William G. Ryan, Chief Engineer, James W. Sewall Company, 147 Center Street, Old Town, Maine

Terry St. Peter, News Director, WLBZ-TV, Mt. Hope Avenue, Bangor, Maine

Archie D. Sanborn, Town Manager, Town of Bucksport, Bucksport, Maine

Philip A. Shaw, Industrial Salesman, R. B. Dunning, Rice Street, Bangor, Maine

Frederick B. Shute, Longshoreman, Stockton Springs, Maine

Donald R. Smith, Acting Project Director, Merrimack River Project, Federal Water Pollution Control Administration, Waterton, Massachusetts

Owen R. Smith, News Reporter, Republican Journal, 66 High Street, Belfast, Maine

Philip D. Spiller, Engineer and Area Representative, Whitman & Howard, Inc., 26 Webster Avenue, Westbrook, Maine

THOSE IN ATTENDANCE (Continued):

Winfield S. Standiford, Belfast Broadcasting Corporation, Owner, Belfast, Maine

Amos P. Stephenson, Director, Belfast Civil Defense and Public Safety, Belfast, Maine

Earle D. Stevens, City Manager, City of Brewer, City Hall, Brewer, Maine

W. R. Straker, Chief Engineer, M. R. Grace & Company, Searsport, Maine

Joseph F. Swink, Selectman, Castine, Maine

Paul F. Talbot, City Manager, Old Town, Maine

Gridley Tarbell, Mayor, City of Belfast, 18 Miller Street, Belfast, Maine

Earle W. Tibbetts, Director, Sanitary Engineering, State Department of Health & Welfare, State House, Augusta, Maine

George K. Tozer, Project Engineer, Metcalf & Eddy, Statler Building, Boston, Massachusetts

Paul M. W. Venno, Marine Resources Scientist, Department of Sea & Shore Fisheries, North Edgecomb, Maine

Mrs. R. C. Wadsworth, 86 Grove Street, Bangor, Maine

Howard I. Weaver, Town Manager, Town of Winterport, Winterport, Maine

THOSE IN ATTENDANCE (Continued):

Patrick H. Welch, Quality Control Supervisor, Great Northern Paper Company, 24 New Hampshire Street, Millinocket, Maine

Lloyd H. Wentworth, L. H. Wentworth, Inc., President, Belfast, Maine

Albert West, Selectman, Stockton Springs, Maine

Donald W. Weston, Deputy Base Engineer, Dow Air Force Base, Maine

Frank H. Whiting, Searsport, Maine

Harry Whitney, Extension Agent, Cooperative Extension Service, Post Office Building, Belfast, Maine

John R. Wiggins, Reporter, Ellsworth American, Ellsworth, Maine

G. R. D. Williams, Counsel, Penobscot Poultry Company, 163 High Street, Belfast, Maine

Roger C. Williams, President, Creative Associates, 53 Baxter Boulevard, Portland, Maine

Edward F. M. Wong, Shellfish Consultant, Federal Water Pollution Control Administration, Merrimack River Project, Watertown, Massachusetts

Mrs. Marie W. Wood, First Selectman, Town of Castine, Castine, Maine

Harry Woodhead, City Engineer, City of Brewer, 53 Parkway North, Brewer, Maine

THOSE IN ATTENDANCE (Continued):

Mrs. Claire M. Young, Belfast, Maine

F. B. Young, Young's Lobster Pound, Searsport Avenue, Belfast, Maine

Robert R. Young, Lobster Fisherman, Belfast, Maine

—

# PROCEEDINGS

## OPENING STATEMENT

## BY

## MR. MURRAY STEIN

MR. STEIN: The conference is open.

This conference in the matter of pollution of the navigable waters of the Penobscot River and Upper Penobscot Bay and their tributaries involving the State of Maine, and the United States Department of the Interior, is being held under the provisions of Section 10 of the Federal Water Pollution Control Act.

Under the provisions of the Act, the Secretary of the Interior is authorized to call a conference of this type when he finds that substantial economic injury results from the inability to market shellfish or shellfish products in interstate commerce because of pollution subject to abatement under the Federal Act and action of Federal, State or local authorities.

This is a relatively new provision in the Federal

Act, and the amendment was introduced by the Chairman of our subcommittee and the man who was largely responsible for a good portion of the current Federal water pollution control legislation, Senator Muskie.

We have had one other case previously under this provision involving shellfish in Long Island, New York. However, we have had, I think, rather extensive experience with shellfish and pollution through the years.

We have two other major cases involving shellfish in other areas, one in Puget Sound, Washington, and the other in Raritan Bay, New York. I know that I and a good portion of the staff have worked for years with the shellfish program on and off.

Our investigators do have a report, and because of the nature of a case of this type, we have brought our experts here, and they will be available. We would like to have a full discussion. If you have any problems or questions, we hope to leave none of these unanswered, because we hope we have the people here who will be able to supply the information.

(in Penobscot River, Maine)

The purpose of the conference is to bring together representatives of the State water pollution control agency, the United States Department of the Interior, and other interested parties to review the existing situation, the progress which has been made, to lay a basis for future action by all parties concerned, and to give the State, localities, and industries an opportunity to take any indicated remedial action under State and local law.

The conference technique is rather an old one. It is used informally by many State agencies in the normal conduct of their business in the field of water pollution control. The conference system was proposed by the United States Supreme Court as long ago as 1921, in the famous case of New York versus New Jersey, involving interstate pollution. I would like to quote from this decision:

> "We cannot withhold the suggestion, inspired by the consideration of this case, that the grave problem of sewage disposal by the large and growing population living on the shores of New York Bay is one more readily to be most wisely solved by cooperative study and by conference and mutual concession on the part of representatives of the States so vitally interested in it than by proceedings in any court however constituted."

We strongly support the conference technique and we measure our success by the problems which are solved at the conference table, rather than in court. I think this is our chance, ladies and gentlemen, because at this stage we are given the most flexibility to come up with an equitable solution which will be satisfactory, and eminently satisfactory, to all parties. Most of our cases have been solved at the conference stage.

As specified in Section 10 of the Federal Water Pollution Control Act, the Secretary of the Interior has notified the official State water pollution control agency of this conference. This conference is between the official State agency and the Federal Water Pollution Control Administration of the United States Department of the Interior.

The State of Maine has designated as its conferee for this conference Mr. Raeburn W. Macdonald, who is on my left. Mr. Lester Klashman, on my right, who is Director for this region of the Federal Water Pollution Control Administration, of the Department of the Interior, with headquarters in Boston, Massachusetts, has been designated as conferee for the Federal Government.

My name is Murray Stein. I am from headquarters of the Federal Water Pollution Control Administration, in Washington, D. C., and the representative of Secretary Udall.

The parties to this conference are the representatives of the State of Maine and the Department of the Interior. Participation in this conference will be open to representatives and invitees of these agencies and such persons as inform me that they wish to present statements. However, only representatives of the State of Maine and the U. S. Department of the Interior constitute the conferees.

Both the State and Federal governments have responsibilities in dealing with water pollution control problems. The Federal Water Pollution Control Act declares that the States have the primary rights and responsibilities for taking action to abate and control pollution. Consistent with this, we are charged by law to encourage the States in these activities

At the same time, the Secretary of the Interior is charged by law with specific responsibilities in the field of water pollution control in connection with the pollution of both interstate and navigable waters. The Federal Water Pollution Control Act provides that pollution of these waters, whether the matter causing or contributing to the pollution is discharged directly into such waters, or reaches such waters after discharge into a tributary, which endangers the health or welfare of any persons, shall be subject to abatement.

The October 1965 amendments to the Federal Water Pollution Control Act additionally empower the Secretary of the Interior to initiate enforcement procedures where he finds that substantial economic injury results from the inability to market shellfish or shellfish products in interstate commerce because of pollution of interstate and navigable waters and the action of Federal, State or local authorities.

The conference will cover the effects on interstate commerce caused by pollution of the shellfish beds in the Penobscot River and Upper Penobscot Bay. We expect the conference will be useful in providing a clear picture of the problem, delineating the progress which has already been accomplished, and indicating what needs to be done to correct the pollution problem in these navigable waters.

Now a word about the procedures governing the conduct of the conference. The conferees will be called upon to make statements. The conferees, in addition, may call upon participants whom they have invited to the conference to make statements. In addition, we will call on other interested parties who wish to present statements. At the conclusion of each statement, the conferees will be given an opportunity to comment or ask questions, and at the conclusion of the conferees' comments or questions I may ask a question or two. This procedure has proven effective in the past in reaching equitable solutions.

At the end of all the statements, we will have a discussion among the conferees and try to arrive at a basis of agreement on the facts of the situation. Then we will attempt to summarize the conference orally, giving the conferees, of course, the right to amend or modify the summary.

Opening Statement - Mr. Stein

Under the Federal law, the Secretary of the Interior is required at the conclusion of the conference to prepare a summary of it which will be sent to the conferees. The summary, according to law, must include the following points:

1. Occurrence of pollution of navigable waters subject to abatement under the Federal Act;
2. Adequcy of measures taken toward abatement of pollution; and,
3. Nature of delays, if any, being encountered in abating the pollution.

The Secretary is also required to make recommendations for remedial action if such recommendations are indicated.

A record and verbatim transcript of the conference is being made by Mr. Al Zimmer. This is being made for the purpose of aiding us in preparing a summary, and also a complete record of what is said here.

We will make copies of the summary and transcript available to the official water pollution control agency of Maine, and that is Mr. Raeburn Macdonald.

We have found that, for the purpose of maintaining relationships within the State that the people who wish summaries and transcripts should request them through their State agency, rather than come directly to the Federal

Government. The reason for this is that when the conference has been concluded we would prefer people who are interested in the problem to follow their normal relations in dealing with the State government rather than the Federal Government on these matters. This has worked successfully in the past and we will be most happy to make this material available to Maine for distribution.

I would like to ask that all speakers and participants other than the conferees making statements come to the lectern and identify themselves for purposes of the record.

It would also be appreciated if any of the participants who have statements will make copies available to the reporter, first of all, and to the conferees, if possible. The man who has probably the hardest job here is the reporter. This gets to be quite a chore at the end of the day, and we can facilitate movement all along, if, wherever possible, we give the reporter a copy of the written statement, which will enable us to proceed expeditiously.

Before going ahead, I would like to take this opportunity to introduce one of our distinguished visitors, and a member of the President's Water Pollution Control Advisory Board who is a representative from Maine, Mr. Robert Patterson.

Mr. Patterson, would you stand up for a moment, please?

(Applause.)

MR. STEIN: We do have a list of people or organizations who have indicated that they wish to make statements. I am going to read the list, not necessarily in the order in which they will be called.

If your name is not on the list and you wish to make a statement, at the first intermission, which we will have after the Federal presentation, it would be appreciated if you would give your name to Mrs. Piere or Miss Light, who will take your name. We will see that you will make the statement.

We would like, of course, the statement to be as short as possible, but we want you to feel free to take the time you think you need for a full exposition of the problem. All we ask is that you try to be germane and stay on the subject. Anything that is relevant we want to hear and take into account.

I think you are going to find that we have a fairly difficult problem and we would like to see if we can, by working together, arrive at an accommodation and, hopefully, a solution.

The names I have are:

Richard L. Crommette, Technical Director, Eastern

Fine Paper - Pulp Division, Standard Packaging Corporation;

Earle D. Stevens, City Manager, Brewer;

John T. Frawley, City Engineer, Bangor;

Robert Ruppert, William Carver, Carver-Greenfield;

Maplewood Packaging Company;

Penobscot Poultry;

St. Regis Paper;

Town of Castine;

Mr. Ronald W. Green, City of Belfast;

Town of Bucksport.

Now, is Mr. John P. Jabar here, the representative of Senator Muskie?

Mr. Jabar, do you wish to make any comments at this time?

MR. JABAR: No, sir. I am only here on behalf of Senator Muskie.

MR. STEIN: Thank you very much.

We also have Mr. Jerome G. Phante, the representative for Congressman Peter N. Kyros.

Mr. Phante, are you here? Do you wish to make a statement?

MR. PHANTE: No, sir. Thank you.

MR. STEIN: Thank you very much.

I take it there are no other Congressional representatives here?

(No response.)

MR. STEIN: With that, we will call on Mr. Klashman for the Federal presentation.

MR. KLASHMAN: Thank you very much, Mr. Stein.

This part of the conference will be taken up with presentations by those representing the Federal Government.

I would like first to introduce Mr. Mark Abelson. Mark, would you mind standing up?

Mr. Abelson represents the Secretary of the Department of the Interior. Mr. Abelson will present a statement later, as well as others who will make statements from the Federal establishment. Those persons will be the Regional Director of the Bureau of Sports Fisheries, Mr. Griffith.

Do you want to stand up?

(Mr. Griffith arose.)

MR. KLASHMAN: Mr. Bonkoski, the State of Maine Coordinator for H.U.D.

(Mr. Bonkoski arose.)

MR. KLASHMAN: And we will hear from Mr. Larson of the United States Public Health Service.

(Mr. Larson arose.)

MR. KLASHMAN: If there are any other Federal representatives who wish to make statements, I wish that you would come up and see me during the intermission following

Mr. Pahren's presentation.

We will now hear a report on the pollution of the navigable waters of the Penobscot River and Upper Penobscot Bay in Maine, from Mr. Herbert Pahren, who is Deputy Regional Director of the Federal Water Pollution Control Administration and in charge of our enforcement activities in the regional office in Boston.

Mr. Pahren.

## STATEMENT OF HERBERT PAHREN, DEPUTY REGIONAL DIRECTOR, FEDERAL WATER POLLUTION CONTROL ADMINISTRATION, DEPARTMENT OF THE INTERIOR, BOSTON, MASSACHUSETTS

MR. PAHREN: Mr. Chairman, Conferees, Ladies and Gentlemen:

In the interests of saving time, I wish to summarize the report, but I do request that the entire report be entered into the record.

MR. STEIN: Without objection, it will be entered as if read.

MR. PAHREN: Thank you.

H. Pahren

## SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

### SUMMARY AND CONCLUSIONS

1. The Commissioner of Sea and Shore Fisheries for the State of Maine, Mr. Ronald W. Green, ordered the closing of the remaining shellfish beds in Searsport and Stockton Springs, Maine, on June 28, 1966, because of the polluted condition of the water. The Federal Water Pollution Control Administration, in conjunction with the United States Public Health Service, conducted an investigation of the Penobscot River below Bangor, Maine, and the upper Penobscot Bay area to determine the sources of this pollution, the direction of travel of this pollution, and the degree of economic injury involved.

2. Discharges from the following communities and industries result in serious pollution in the Penobscot River and upper Penobscot Bay area:

Bangor

S. A. Maxfield Co., Bangor

Brewer

Standard Packaging Corp., Brewer

Hampden

Winterport

Frankfort

Bucksport

St. Regis Paper Co., Bucksport

Maine Blueberry Growers, Penobscot

Castine

Maine Maritime Academy, Castine

Stockton Springs

Searsport

Northern Chemical Industries, Inc., Searsport

Bangor and Arroostook R. R. Co., Searsport

Freighters and tankers serving Shell Oil Co., C. H. Sprague and Sons, Inc.; Jarka Corporation of New England; and U. S. Air Force Petrol Depot, Searsport

Belfast

Belfast Canning Co., Belfast

Maplewood Packing Co., Belfast

Penobscot Poultry Co., Inc., Belfast

Sherman and Company, Belfast

Northport

These discharges caused the closure of the shellfish beds in Northport, Belfast, Searsport, Stockton Springs, Penobscot, Castine, and may cause the closure of some of the beds in Islesboro. There is presently a harvestable standing crop of 96,600 bushels of soft shell clams; these are worth from $1,900,000 to $5,200,000. An estimated harvestable standing crop of 46,200 bushels of clams worth from $900,000 to $2,500,000 would be available during the next year.

3. Bacteria equivalent to those in raw sewage of approximately 70,300 persons are discharged at the present time in the study area. The communities of Bangor and Brewer contribute 65 percent of the total, while the two poultry plants in Belfast discharge 11 percent. The remaining 24 percent is contributed by the following sources:

S. A. Maxfield Co., Bangor;
Standard Packaging Corp., Brewer;
Hampden;
Winterport;
Frankfort;
Bucksport;
St. Regis Paper Co., Bucksport;
Maine Blueberry Growers, Penobscot;
Castine;
Maine Maritime Academy, Castine;
Stockton Springs;
Searsport;
Northern Chemical Industries, Inc., Searsport;

H. Pahren

Bangor and Arroostook R. R. Co., Searsport;

Freighters and tankers serving Shell Oil Co.,
C. H. Sprague and Sons, Inc., Jarka Corporation
of New England, and U. S. Air Force Petrol
Depot, Searsport;

Belfast;

Belfast Canning Co!, Belfast;

Sherman and Company, Belfast;

Northport.

Coliform bacteria exceeded the 70 MPN/100 ml maximum value for harvesting shellfish at every sampling location except two, and coliform bacteria analyses of the clam meat clearly indicate that the waters were polluted. A median of 70 MPN/100 ml is used by the State of Maine as the maximum for taking of shellfish. Disease-causing Salmonella bacteria were identified in the waters polluted by discharges from both community and industrial plant sources.

4. Sewage and industrial wastes presently discharged have an estimated population equivalent of 1,190,000, as measured by biochemical oxygen demand, of which the paper industries contribute more than 90 percent of the total. Data from the State of Maine show that the dissolved oxygen is reduced by these discharges and is at times zero. This reduction of dissolved oxygen destroys fish and fish food organisms and prevents the passage of anadromous fish, such

as salmon. If pollution were reduced, the Penobscot River could support fish and aquatic life; and with the construction of fish passageways, the river could also support runs of the anadromous fish.

5. Discharges of suspended solids create a severe water pollution problem in Belfast Bay, Stockton Harbor and Penobscot River. These materials cause sludge deposits which deplete the water's oxygen supply; produce offensive odors, especially when tidal flats are exposed; reduce or eliminate aquatic life which serves as food for fishes; smother shellfish and/or prevent their propagation. The suspended solids also make these once attractive waters appear turbid and dingy. The amount of suspended solids discharged is equivalent to the raw sewage of 633,000 persons; of these about 83 percent come from two pulp and paper mills.

6. Discharges of sulfite waste liquor from pulp and paper mills, in addition to adding suspended solids, organic matter causing biochemical oxygen demand, and materials that discolor the receiving stream, do have a toxic effect on aquatic life. Standard Packaging Corporation in Brewer and St. Regis Paper Company in Bucksport both release wastes of this type.

7. Studies of the water currents, along with bacteriological and sulfite waste liquor analyses, show that

wastes discharged to the Penobscot River caused pollution of Stockton Harbor, Long Cove, Searsport Harbor, Belfast Bay, Penobscot Bay, Castine Harbor, and the shores of Islesboro Island. In addition, Belfast wastes pollute Belfast Bay, and, under recurrent tidal and wind conditions, contribute to the bacterial densities of Searsport Harbor, Long Cove, Stockton Harbor, Islesboro Island and waters south of Belfast Bay. Wastes from Searsport are polluting the waters of Searsport Harbor, Long Cove and Stockton Harbor. Wastes from Stockton Springs increase the bacterial densities of Stockton Harbor and Fort Point Cove, while Castine and the Maine Maritime Academy cause pollution of the waters in Castine.

8. The waters of the study area have been classified by the State of Maine. Part of Belfast Bay was classified as suitable only for transportation of sewage and industrial wastes without a public nuisance. According to the existing State classification, the taking of shellfish will not be a legitimate water use in the future, except in a small part of Searsport in Stockton Harbor and on the western side of Islesboro Island below Marshall Point, since it will be legal to exceed 70 MPN/100 ml in the waters overlying a shellfish bed. The Maine water quality standards should be upgraded to reflect, more truly, legitimate water uses in the area.

9. Water quality requirements have been developed

by the Merrimack River Project for the pollutional discharges and for various sections of the upper Penobscot Bay area. These requirements are contained in the recommendations section. The recommended quality can be achieved if the sources of pollution listed above provide adequate treatment. The water quality requirements would allow the waters in the communities of Northport, Searsport, Stockton Springs, Penobscot, Castine, Islesboro, Belfast east of Goose River, and Belfast south of latitude 44°24'N to be used for:

Shellfish Production
Lobster Production
Commercial Fishing, including anadromous fish
Aesthetics
Industrial - Processing and Cooling
Recreation - Whole Body Contact
Sport Fishing
Pleasure Boating
Wildlife
Navigation

The water quality requirements would allow the waters in Belfast west of Goose River and in Belfast north of latitude 44°24'N to be used for:

Lobster Production
Commercial Fishing

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Aesthetics

Industrial Water - Processing and Cooling

Recreation - Whole Body Contact

Sport Fishing

Pleasure Boating

Wildlife

Navigation

The water quality requirements would allow the waters in the Penobscot River from the Bangor Dam to the southern tip of Verona Island to be used for:

Commercial Fishing, including anadromous fish

Aesthetics

Industrial Water - Processing and Cooling

Recreation - Limited Body Contact

Sport Fishing

Pleasure Boating

Wildlife

Navigation

10. Substantial economic injury results from the inability to market shellfish or shellfish products in interstate commerce because of pollution caused by sewage and industrial wastes discharged to the Penobscot River and Upper Penobscot Bay area, and action of State authorities. Accordingly, the pollution of these navigable waters is subject

9 to abatement under procedures described in Section 10 of the Federal Water Pollution Control Act, as amended.

RECOMMENDATIONS

Receiving Waters

It is recommended that:

a. The tidal and marine waters in the communities of Northport, Searsport, Stockton Springs, Penobscot, Castine, Islesboro, Belfast east of Goose River, and Belfast south of latitude 44°24'N meet Water Quality Requirements I shown in Table 1.

b. The tidal and marine waters in Belfast west of Goose River and in Belfast north of latitude 44°24'N meet Water Quality Requirement II shown in Table 2.

c. The Penobscot River from the Bangor Dam to the southern tip of Verona Island meet Water Quality Requirements III shown in Table 3.

## TABLE I

## WATER QUALITY REQUIREMENTS-I

Total Coliform Bacteria - MPN per 100 ml

Weekly median not more than 70 and no more than 10 percent of the values greater than 230.

Dissolved Oxygen - mg/l

Average over a 24-hour period shall not be less than 6.0. At no time shall the dissolved oxygen be less than 5.0.

True Color - Units

Not more than 30 at any time

Turbidity

No turbidity of other than natural origin that will cause substantial visible contrast with the natural appearance of the water.

Sulfite Waste Liquor (10% solids basis) - ppm

Not more than 10 at any time

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### pH Units

Within range 6.9 - 8.5 at all times.

### Odor

No obnoxious odors other than those of natural origin.

### Temperature -°C

Daily average not more than 20.

At no time shall temperature exceed 25.

### Oil or Grease

Substantially free of oil or grease.

### Floating Solids and Debris

Substantially free of floating solids and debris from other than natural sources.

### Bottom Deposits

Substantially free of pollutants that will:

(1) unduly affect the composition of the bottom fauna; (2) unduly affect the physical or chemical nature of the bottom; (3) unduly interfere with the spawning of fish or their eggs.

Substances Potentially Toxic

Not in toxic concentrations or combinations.

* * *

TABLE 2

WATER QUALITY REQUIREMENTS - II

Total Coliform Bacteria - MPN per 100 ml

Weekly arithmetic average not more than 1,000.

Dissolved Oxygen - mg/l

Average over a 24-hour period shall not be less than 6.0. At no time shall the dissolved oxygen be less than 5.0.

True Color - Units

Not more than 30 at any time.

Turbidity

No turbidity of other than natural origin that

13 will cause substantial visible contrast with the natural appearance of the water.

Sulfite Waste Liquor (10% solids basis) - ppm

Not more than 10 at any time.

pH - Units

Within range 6.9 - 8.5 at all times.

Odor

No obnoxious odors other than those of natural origin.

Temperature - °C

Daily average not more than 20.

At no time shall temperature exceed 25.

Oil or Grease

Substantially free of oil or grease.

Floating Solids and Debris

Substabtially free of floating solids and debris from other than natural sources.

29

Bottom Deposits

Substantially free of pollutants that will: (1) unduly affect the composition of the bottom fauna; (2) unduly affect the physical or chemical nature of the bottom; (3) unduly interfere with the spawning of fish or their eggs.

Substances Potentially Toxic

Not in toxic concentrations or combinations.

* * *

## TABLE 3

## WATER QUALITY REQUIREMENTS - III

Total Coliform Bacteria - MPN per 100 ml

Weekly arithmetic average not more than 5,000.

Dissolved Oxygen - mg/l

Average over a 24-hour period shall not be less than 5.0. At no time shall the dissolved oxygen be less than 4.0.

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15 True Color - Units

Not more than 30 at any time.

Turbidity

No turbidity of other than natural origin that will cause substantial visible contrast with the natural appearance of the water.

Sulfite Waste Liquor (10% solids basis) - ppm

Not more than 50 at any time.

pH - Units

Within range 6.0 - 8.5 at all times.

Odor

No obnoxious odors other than those of natural origin.

Temperature

Daily average not more than 25.

At no time shall temperature exceed 30.

16 **Oil or Grease**

Substantially free of oil or grease.

**Floating Solids and Debris**

Substantially free of floating solids and debris from other than natural sources.

**Bottom Deposits**

Substantially free of pollutants that will: (1) unduly affect the composition of the bottom fauna; (2) unduly affect the physical or chemical nature of the bottom; (3) unduly interfere with the spawning of fish or their eggs.

**Substances Potentially Toxic**

Not in toxic concentrations or combinations.

17 Municipal Waste

The communities of Northport, Belfast, Searsport, Stockton Springs, Frankfort, Winterport, Hampden, Bangor, Brewer, Bucksport and Castine and the Maine Maritime Academy are to provide secondary treatment of all dry-weather wastes. Secondary treatment means at least 90 percent removal of BOD and suspended solids. Facilities are to be efficiently operated, are to have a deep bay or river outfall at the point of discharge, where necessary, and are to disperse the effluent adequately. All wastes are to be disinfected and in all cases there is to be a density of coliform bacteria not greater than 5,000 MPN per 100 ml before dilution. In any case, the requirements of the receiving waters are to be met. Separation of sanitary wastes from combined sewers or adequate treatment, including disinfection of storm-water overflows from combined sewers, is to be provided. No new combined sewers are to be constructed.

Industrial Wastes

It is recommended that the industries that discharge their industrial and domestic wastes provide secondary treatment or the equivalent for all their wastes. Facilities are to be efficiently operated and have a deep bay or river outfall at the point of discharge, where needed, and are to disperse the wastes adequately. All wastes are to be disinfected, where necessary, and all domestic sewage is to be disinfected. In all cases there is to be a density of coliform bacteria not greater than 5,000 MPN/ 100 ml before dilution. In any case, the requirements of the receiving waters are to be met. It is recommended that the following industries provide additional treatment which will result in an effluent limit for the following pollutional constituents:

Standard Packaging Corporation, Brewer, Maine

Sulfite waste liquor - total shall not exceed 12,000 pounds of concentrated liquor per day.

St. Regis Paper Company, Bucksport, Maine

Sulfite waste liquor - total shall not exceed 12,000 pounds of concentrated liquor per day.

Northern Chemical Industries, Incorporated, Searsport, Maine

Total coliform bactera - Maximum value of 70 MPN/100 ml at any time.

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Bangor and Arroostook Railroad Company,

Searsport, Maine

Total coliform bacteria - Maximum value of 70 MPN/100 ml at any time.

Freighters and Tankers serving Searsport, Maine

All wastes shall be pumped to a land based sewage treatment plant or town sewer line if a non-overflowing holding tank is not used when anchored or docked in the Upper Penobscot bay area. If a land based sewage treatment plant is used, the density of total coliform bacteria from this plant shall not exceed 70 MPN/100 ml at any time.

Maine Blueberry Growers, Penobscot, Maine

Total coliform bacteria - Maximum value of 70 MPN/100 ml at any time.

Belfast Canning Company, Belfast, Maine

No visible grease at any time.

Maplewood Packing Company, Belfast, Maine

No visible feathers or grease at any time.

Penobscot Poultry Company, Inc., Belfast, Maine

No visible feathers or grease at any time.

Time Schedule

1. Preliminary plans for abatement of all dry-weather sources of pollution are to be completed by January 1, 1968.

2. Preliminary plans for storm water overflows from combined sewers are to be completed by May 1, 1969.

3. All dry-weather sources of pollution are to have final plans and specifications approved by the Maine Water Improvement Commission by December 1, 1968, and are to have arranged, voted, and authorized financing by May 1, 1969.

4. Construction of facilities for dry-weather wastes is to be started by all sources ofpollution by July 1, 1969.

5. All remedial action necessary for the abatement of dry-weather pollution is to be completed by November 1, 1970.

## INTRODUCTION

On June 28, 1966, Mr. Ronald W. Green, Commissioner of Sea and Shore Fisheries for the State of Maine signed an order which closed the remaining shellfish beds in Searsport and Stockton Springs, Maine, due to pollution of waters flowing over those beds. The Public Notice is shown in the Appendix.

Pollution by water-borne sewage and industrial wastes has caused almost all of the shellfish beds in the upper part of the Penobscot Bay area to be closed for the harvesting of shellfish. The only remaining open beds are located on Islesboro Island. This area is under observation by the Maine Department of Sea and Shore Fisheries to determine if the beds should be closed.

As a result of the pollution of navigable waters which are used for harvesting shellfish, the Federal Water Pollution Control Administration conducted an investigation to determine the sources of pollution, direction of travel of the pollutants, and degree of economic injury involved.

The study area, located entirely within the State of Maine, is shown in Figure 1 (fold-out at back of report), and includes the Penobscot River below Bangor, Maine, and the upper Penobscot Bay area. The Penobscot River is the major source of fresh water that flows into Penobscot Bay. This river has a watershed of over 7,700 square miles at Bangor. The effects of the tides reach to the dam in Bangor some 24 miles from Penobscot Bay.

Numerous personnel and agencies assisted in the study. The Maine Department of Sea and Shore Fisheries provided data, participated in the investigation of the value of the shellfish resources, and furnished laboratory assistance. The Maine Water Improvement Commission provided previous reports, information on waste discharges, and other helpful material. The United States Public Health Service, through its Regional Office and the Northeast Shellfish Sanitation Research Center, furnished personnel, data, and equipment and provided material for the section of the report on the value of the shellfish resources. Assistance was also provided by the Hudson-Champlain and Metropolitan Coastal Project and the R. A. Taft Sanitary Engineering Center, Federal Water Pollution Control Administration. Mr. Frederick Young of Belfast, Maine, provided utilities and furnished a site for the mobile laboratory. Towns, industries and citizens of the upper Penobscot Bay area provided information useful to the overall study. The cooperation of all is gratefully acknowledged.

## SOURCES OF POLLUTION

### GENERAL

Both sewage and industrial wastes contain a variety of obnoxious constituents which can damage water quality and restrict its use. Sewage contains astronomical numbers of intestinal bacteria which were released in man's excretions. Certain industrial wastes, such as those from poultry processing plants, also contain these same organisms. Some of these bacteria may be pathogens which can infect man with a variety of diseases either by direct ingestion of polluted water or indirectly, as when eating raw or partially cooked shellfish.

Oxygen-demanding materials found in sewage and industrial wastes can limit or destroy fish, clams, fish food organisms, and other desirable aquatic life by removing dissolved oxygen from the water. Greasy substances can form objectionable surface scums; feathers make the waters and banks unsightly; suspended solids make attractive waters turbid and dingy; settleable solids can create sludge deposits; and materials causing water to be colored make it aesthetically unpleasant and can also possibly limit or destroy shellfish and other aquatic life.

The oxygen demand of sewage and industrial wastes, as measured by the 5-day Biochemical Oxygen Demand (BOD) test, indicates their potential for reducing the dissolved oxygen content of the waters.The coliform bacteria content of raw and treated sewage and industrial waste discharged to a watercourse indicates the density of sewage-associated bacteria, which may include disease-producing organisms. The oxygen-demanding loads can be expressed as population equivalent (PE) of 5-day BOD, suspended solids loads as suspended solids population equivalent (SSPE), and the bacterial loads as bacterial population equivalents (BPE) of total coliform bacteria. Each PE, SSPE, or BPE unit represents the average amount of oxygen demand, suspended solids, or total coliform bacteria normally contained in sewage contributed by one person in one day.

Primary treatment plants, which consist essentially of settling tanks and sludge digesters, can remove most scums and grease, feathers, wood fibers and other settleable solids, about one-third of the BOD, and approximately 50 percent of the bacteria. Secondary plants include secondary biological treatment units, such as oxidation lagoons, trickling filters, or activated sludge systems. Such plants can remove 90 to 95 percent of the BOD, suspended solids, and coliform bacteria. Chlorination facilities for disinfection of properly treated sewage and industrial waste effluents can destroy more than 99 percent of the sewage bacteria. To accomplish these reductions, however, treatment facilities must be properly designed, have adequate operating funds, and be skillfully operated.

Estimates have been made of the characteristics of the wastes discharged to the study area. These estimates are based primarily on information from the Maine Water Improvement Commission, engineering reports for various towns, and personal interviews with industrial officials. The estimates are summarized in Table 4.

## BACTERIA

Sewage is the principal source of bacterial pollution in the upper Penobscot Bay area, although poultry plants in Belfast contribute more than 11 percent of the 70,305 bacterial population equivalents discharged in the study area.

Individual septic tanks are usually considered primary treatment when the effluent is discharged to a watercourse. This is the only type of treatment that any of the sewage entering the waters in the study area receive. Over 99 percent of the sewage receives no treatment.

Figure 2 shows the relative bacterial loads from sources in the study area. Bangor and Brewer account for about 65 percent of the total bacterial loads.

In addition to sewage being discharged from land areas, there is sewage discharged directly to the Penobscot Bay from freighters and tankers that dock at Searsport.

## TABLE 4

## ESTIMATED CHARACTERISTICS OF SEWAGE AND INDUSTRIAL WASTES DISCHARGED TO PENOBSCOT BAY AND TRIBUTARIES WITHIN STUDY AREA[1].

| DISCHARGE | TYPE OF TREATMENT | POPULATION EQUIVALENTS DISCHARGED | | | | | |
|---|---|---|---|---|---|---|---|
| | | BACTERIAL | | SUSPENDED SOLIDS | | OXYGEN DEMAND | |
| | | NUMBER | % TOTAL | NUMBER | % TOTAL | NUMBER | % TOTAL |
| Bangor | None | 37,000 | 52.64 | 37,000 | 5.84 | 37,000 | 3.10 |
| S. A. Maxfield Co., Bangor | None | 40 | 0.06 | 10,000 | 1.58 | 6,000 | 0.50 |
| Brewer | None | 8,600 | 12.24 | 8,600 | 1.36 | 8,600 | 0.72 |
| Standard Packaging Corp., Brewer | None | 700 | 1.00 | 195,000 | 30.80 | 710,000 | 59.60 |
| Hampden | None | 2,800 | 3.98 | 2,800 | 0.44 | 2,800 | 0.24 |
| Winterport | None | 1,000 | 1.42 | 1,000 | 0.16 | 1,000 | 0.08 |
| Frankfort | None | 50 | 0.07 | 50 | 0.01 | 50 | 0.01 |
| Bucksport | None | 2,000 | 2.84 | 2,000 | 0.32 | 2,000 | 0.17 |
| St. Regis Paper Co., Bucksport | None | 750 | 1.07 | 330,000 | 52.13 | 370,000 | 31.05 |
| Maine Blueberry Growers, Penobscot | None | 100 | 0.14 | 1,000 | 0.16 | 1,000 | 0.08 |
| Castine | None | 2,000 | 2.84 | 2,000 | 0.32 | 2,000 | 0.17 |
| Maine Maritime Academy, Castine | None | 600 | 0.85 | 600 | 0.09 | 600 | 0.05 |
| Stockton Springs | Partly none & partly septic tanks[2] | 50 | 0.07 | 50 | 0.01 | 50 | 0.01 |
| Searsport | Partly none & partly septic tanks[2] | 1,000 | 1.42 | 1,000 | 0.16 | 1,000 | 0.08 |
| Northern Chemical Industries, Inc., Searsport | Partly raw, partly septic tanks & partly settling basins | 50 | 0.07 | 20,000 | 3.16 | 100 | 0.01 |
| Bangor and Aroostook R. R. Co., Searsport | Septic tank[2] | 10 | 0.01 | 10 | 0.01 | 10 | 0.01 |
| Freighters and tankers serving Shell Oil Co.; C. H. Sprague and Sons, Inc.; Jarka Corporation of New England, and U.S. Air Force Petrol Depot, Searsport | None | 20 | 0.03 | 20 | 0.01 | 20 | 0.01 |
| Belfast | None | 4,500 | 6.40 | 4,500 | 0.71 | 4,500 | 0.38 |
| Belfast Canning Co., Belfast | None | 25 | 0.04 | 4,100 | 0.65 | 15,600 | 1.31 |
| Maplewood Packing Co., Belfast | Screening | 4,000 | 5.69 | 5,600 | 0.88 | 13,500 | 1.13 |
| Penobscot Poultry Co., Inc., Belfast | Screening | 4,000 | 5.69 | 5,600 | 0.88 | 13,500 | 1.13 |
| Sherman and Company, Belfast | None | 10 | 0.01 | 1,000 | 0.16 | 1,000 | 0.08 |
| Northport | None | 1,000 | 1.42 | 1,000 | 0.16 | 1,000 | 0.08 |
| TOTAL | | 70,305 | 100.00 | 632,930 | 100.00 | 1,191,330 | 100.00 |

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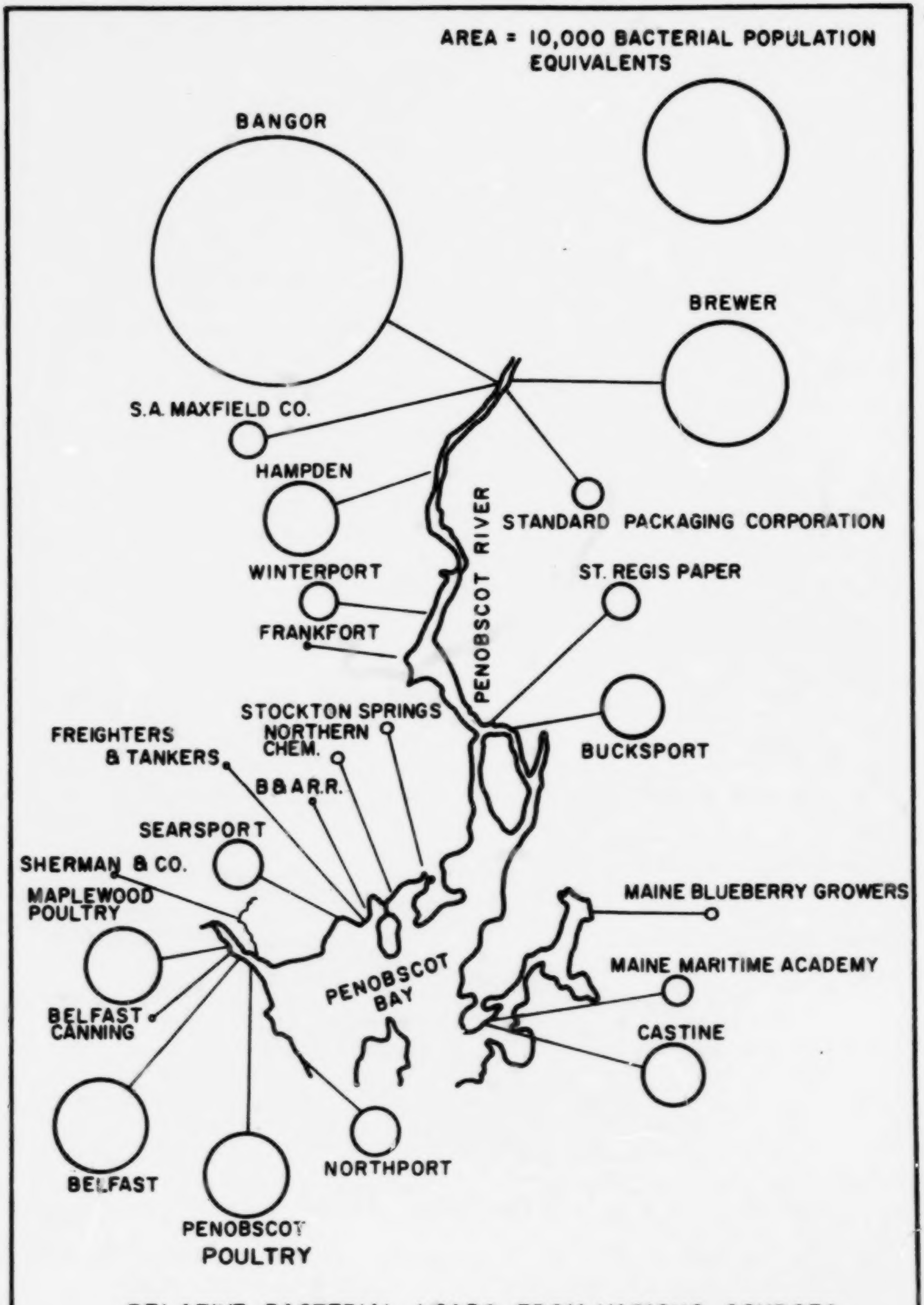
[1] All population equivalents are for summer.

[2] Some septic tanks overflow to watercourse.


AREA = 10,000 BACTERIAL POPULATION EQUIVALENTS
BANGOR
BREWER
S.A. MAXFIELD CO.
HAMPDEN
STANDARD PACKAGING CORPORATION
PENOBSCOT RIVER
WINTERPORT
ST. REGIS PAPER
FRANKFORT
STOCKTON SPRINGS
NORTHERN CHEM.
FREIGHTERS & TANKERS
B&A R.R.
BUCKSPORT
SEARSPORT
SHERMAN & CO.
MAPLEWOOD POULTRY
MAINE BLUEBERRY GROWERS
MAINE MARITIME ACADEMY
PENOBSCOT BAY
BELFAST CANNING
CASTINE
BELFAST
NORTHPORT
PENOBSCOT POULTRY

RELATIVE BACTERIAL LOADS FROM VARIOUS SOURCES

FIGURE 2

## SUSPENDED SOLIDS

The overall suspended solids discharged to the study area are equivalent to those in the raw sewage of about 633,000 persons. Over 90 percent of the suspended solids discharged emanate from industrial plants. One of the two largest sources of suspended solids is the St. Regis Paper Company at Bucksport, where 330,000 suspended solids population equivalents, approximately 52 percent of the total, originate. The other large source of suspended solids is the Standard Packaging Corporation in Brewer, which discharges approximately 31 percent of the total suspended solids. Figure 3 indicates the relative amount of suspended solids discharged to the study area from each source.

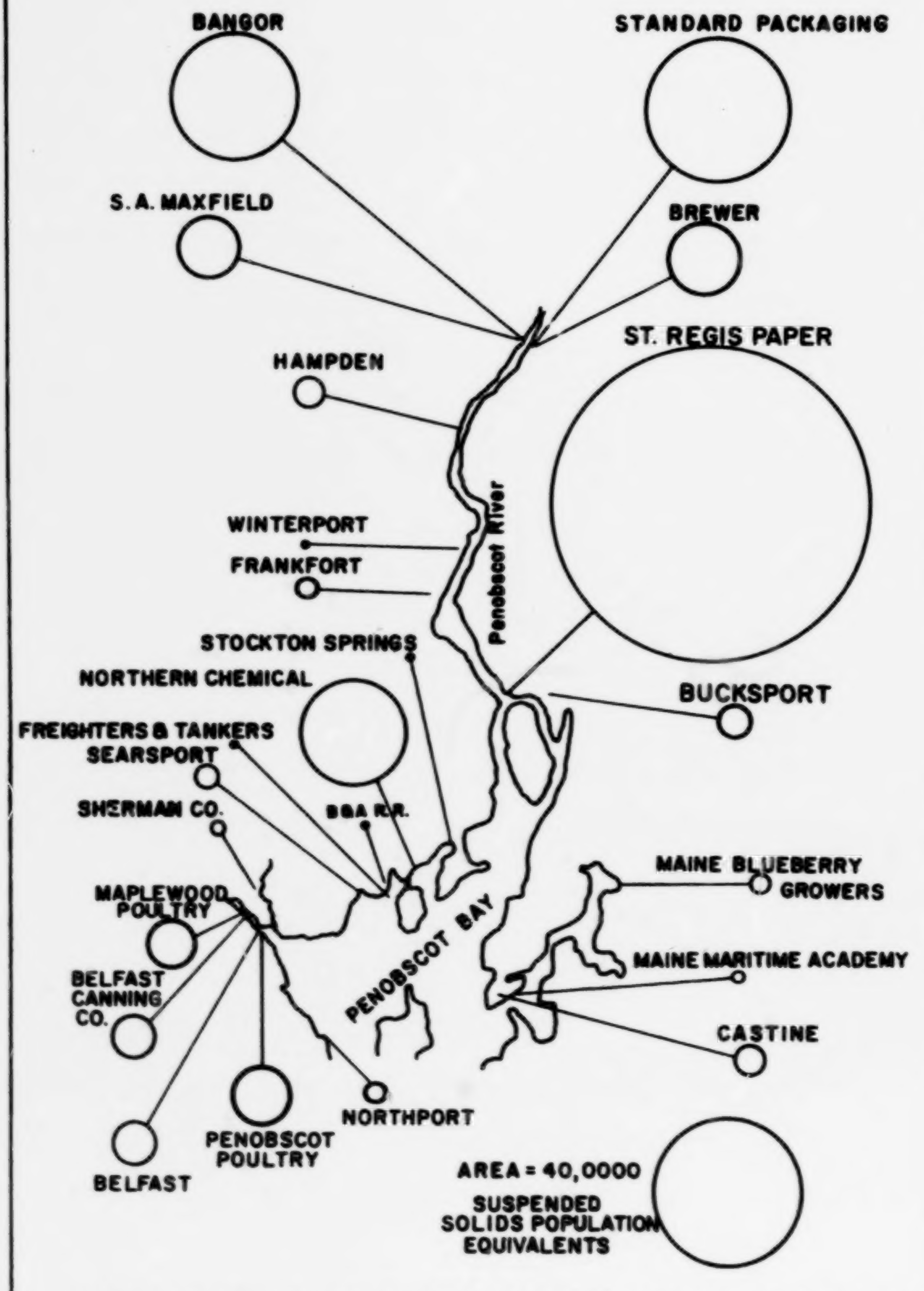
## BIOCHEMICAL OXYGEN DEMAND

Sewage and industrial wastes presently discharged to the study area have an estimated biochemical oxygen demand (BOD) of 1,191,000 population equivalents. Industrial discharges contribute approximately 95 percent of the total. The wastes from Standard Packaging Corporation contain a population equivalent of 710,000 as measured by BOD, or 59.6 percent of the 1,191,000. St. Regis Paper Company in Bucksport discharges wastes containing a BOD equivalent to raw sewage from approximately 370,000 persons. This is 31 percent of the total BOD load. Other individual sources ranged from 0.01 to 3.1 percent with Belfast Canning Company, Maplefwood Packing Company, and Penobscot Poultry Company, Incorporated, all of Belfast, Maine, together accounting for 3.6 percent of the total. Figure 4 indicates the relative amount of biochemical oxygen demand loads discharged to the waters of the study area.

## SULFITE WASTE LIQUOR

Sulfite waste liquor arises from the process of manufacturing sulfite pulp. A standardized method, called the Pearl-Benson method, is used to estimate sulfite waste liquor concentrations in waters.

It is estimated that over 99 percent of the sulfite waste liquor, as measured by the Pearl-Benson test, found in the upper Penobscot Bay area, originated in the Penobscot River. The Standard Packaging Corporation in Brewer and the St. Regis Paper Company in Bucksport both discharge sulfite waste liquors. Sources upstream of Bangor, Maine, also contribute to the total.


BANGOR
STANDARD PACKAGING
S. A. MAXFIELD
BREWER
ST. REGIS PAPER
HAMPDEN
Penobscot River
WINTERPORT
FRANKFORT
STOCKTON SPRINGS
NORTHERN CHEMICAL
BUCKSPORT
FREIGHTERS & TANKERS
SEARSPORT
SHERMAN CO.
B&A R.R.
MAINE BLUEBERRY GROWERS
MAPLEWOOD POULTRY
PENOBSCOT BAY
MAINE MARITIME ACADEMY
BELFAST CANNING CO.
CASTINE
NORTHPORT
PENOBSCOT POULTRY
BELFAST
AREA = 40,0000
SUSPENDED SOLIDS POPULATION EQUIVALENTS

RELATIVE SUSPENDED SOLIDS LOADS FROM VARIOUS SOURCES

FIGURE 3

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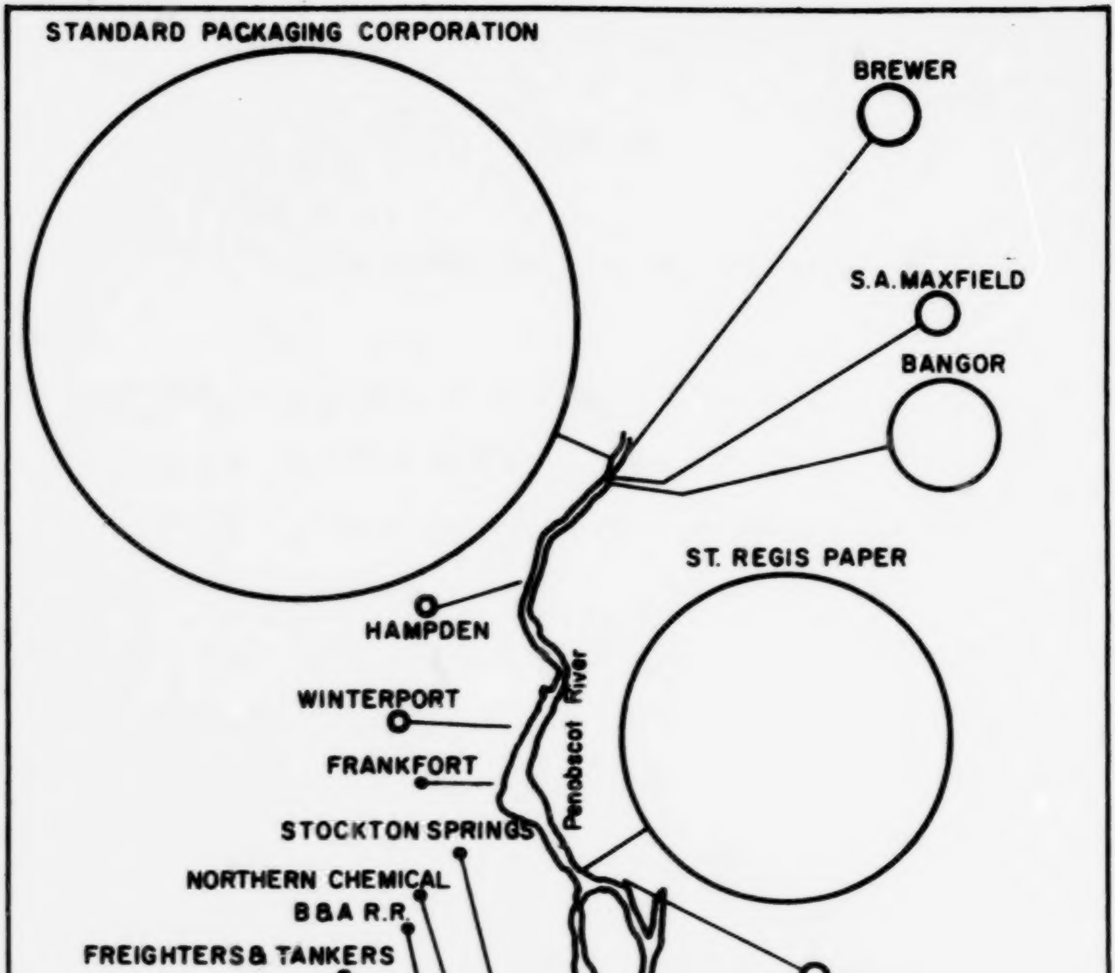

STANDARD PACKAGING CORPORATION
BREWER
S.A. MAXFIELD
BANGOR
ST. REGIS PAPER
HAMPDEN
WINTERPORT
FRANKFORT
Penobscot River
STOCKTON SPRINGS
NORTHERN CHEMICAL
B&A R.R.
FREIGHTERS & TANKERS
SEARSPORT
BUCKSPORT
SHERMAN & CO.
MAINE BLUEBERRY GROWERS
MAPLEWOOD POULTRY
MAINE MARITIME ACADEMY
Penobscot Bay
BELFAST CANNING CO.
CASTINE
NORTHPORT
AREA = 100,000 OXYGEN DEMAND POPULATION EQUIVALENTS
BELFAST
PENOBSCOT POULTRY

RELATIVE OXYGEN DEMAND LOADS FROM VARIOUS SOURCES

FIGURE 4

### H. Pahren

# WATER CURRENT IN UPPER PENOBSCOT BAY

The upper portion of Penobscot Bay, between 44°20'N and 44°30'N, has a maximum width of some eight miles. Islesboro Island divides the south portion into two parts, of which the eastern part is somewhat larger. See Figure 1. Bathymetry, or bottom topography, is rather regular. Maximum depths of 270 feet occur in the south ends of both the east and west parts of the bay, while most of the upper Penobscot Bay has a depth of 30 to 60 feet.

The Penobscot River, with an average summer flow greater than 5,000 cfs, flows southward into the northeast portion of the bay. The Passagassawakeag River, with an average summer flow of about 5-10 cfs, enters from the northwest through Belfast Bay. In a clockwise direction from Northport, the other named streams entering Penobscot Bay are Little River, Goose River, Mill Brook, and Cove Brook. Each usually has a summer flow into the bay area of less than 10 cfs.

The maximum spring tidal range of 11.8 feet occurs at Fort Point. The range at Belfast is 11.5 and at Castine 11.1 feet. The tide is semi-diurnal; successive highs (and lows) may differ in height by as much as 1.5 feet.

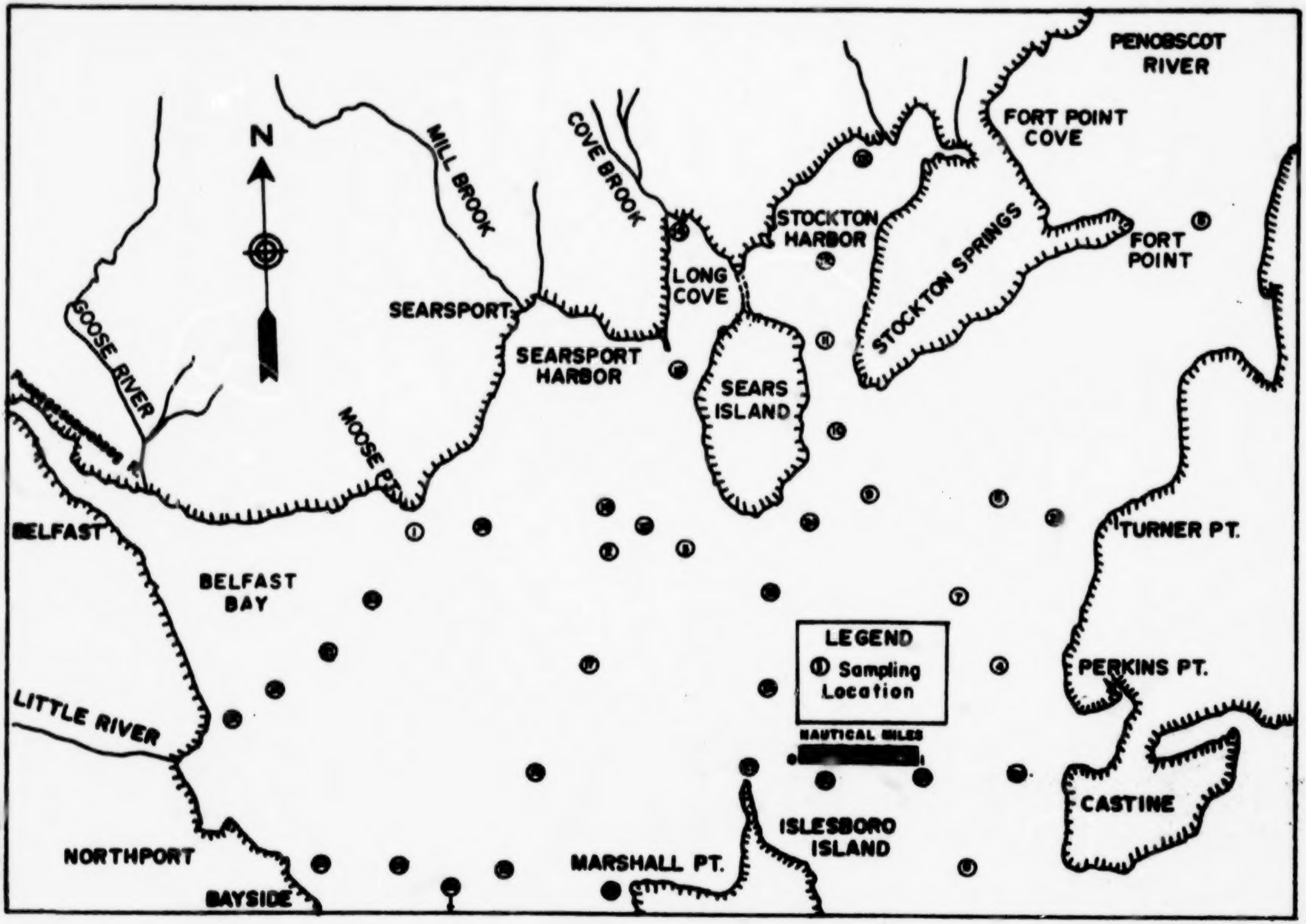
## WATER TEMPERATURES AND CONDUCTIVITY

The temperature sampling locations are shown in Figure 5. Figures 6 and 7 show that temperature and conductivity generally follow the same pattern.

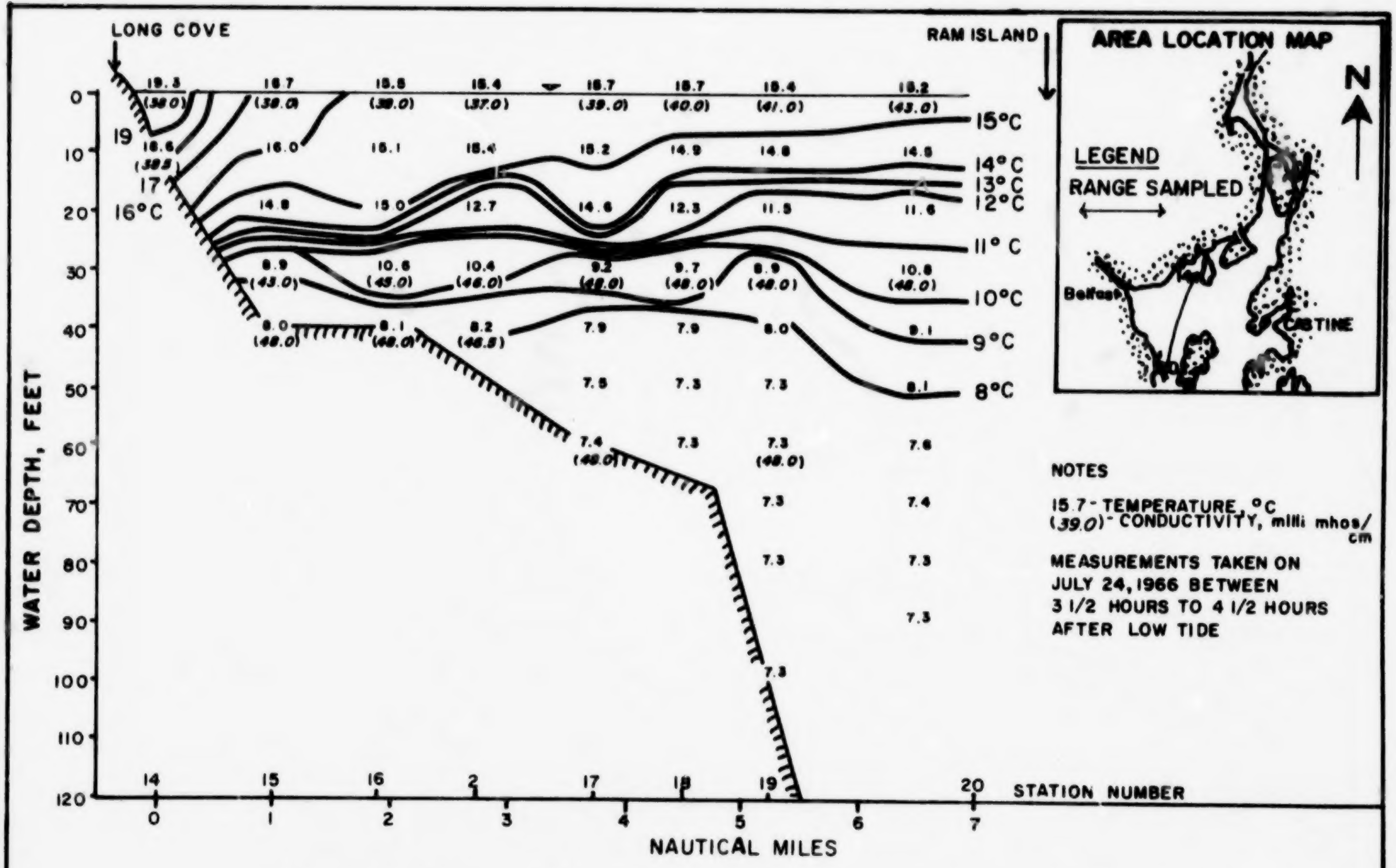
At the time of the field study, Penobscot River water had temperatures above 12°C ( Figure 7) and sea water had a temperature of about 7°C. Water above 12°C was found to depths of 25 feet at the U. S. 1 highway bridge below Bucksport, to 8 feet at Fort Point, and on the surface below Castine in the eastern part of the bay in July during flood tide. Water of 12°C or above is found to depths of 7.5 feet from Perkins Point in Castine to the entrance of Stockton Harbor, and to depths of 15 feet withing Stockton Harbor in July during early flood tide (Figure 8).

Figures 9, 10 and 11 show that much of the warmer Penobscot River water was flowing out in a channel between Sears Island and Islesboro Island and that the Penobscot River water was flowing primarily in the top 20 feet of water. Penobscot River water did not extend into Belfast Bay on ebb tide since there was not an increase in temperature. This is shown best on Figures 10, 11 and 12. Belfast Bay water appears to have a fairly uniform temperature across the bay,

FIGURE 5


PENOBSCOT RIVER
FORT POINT COVE
FORT POINT
STOCKTON SPRINGS
STOCKTON HARBOR
LONG COVE
COVE BROOK
SEARS ISLAND
SEARSPORT HARBOR
SEARSPORT
MILL BROOK
N
GOOSE RIVER
MOOSE PT.
BELFAST
BELFAST BAY
LITTLE RIVER
NORTHPORT
BAYSIDE
MARSHALL PT.
ISLESBORO ISLAND
CASTINE
PERKINS PT.
TURNER PT.
LEGEND
① Sampling Location
NAUTICAL MILES
0
1

TEMPERATURE SAMPLING LOCATIONS - PENOBSCOT BAY AREA



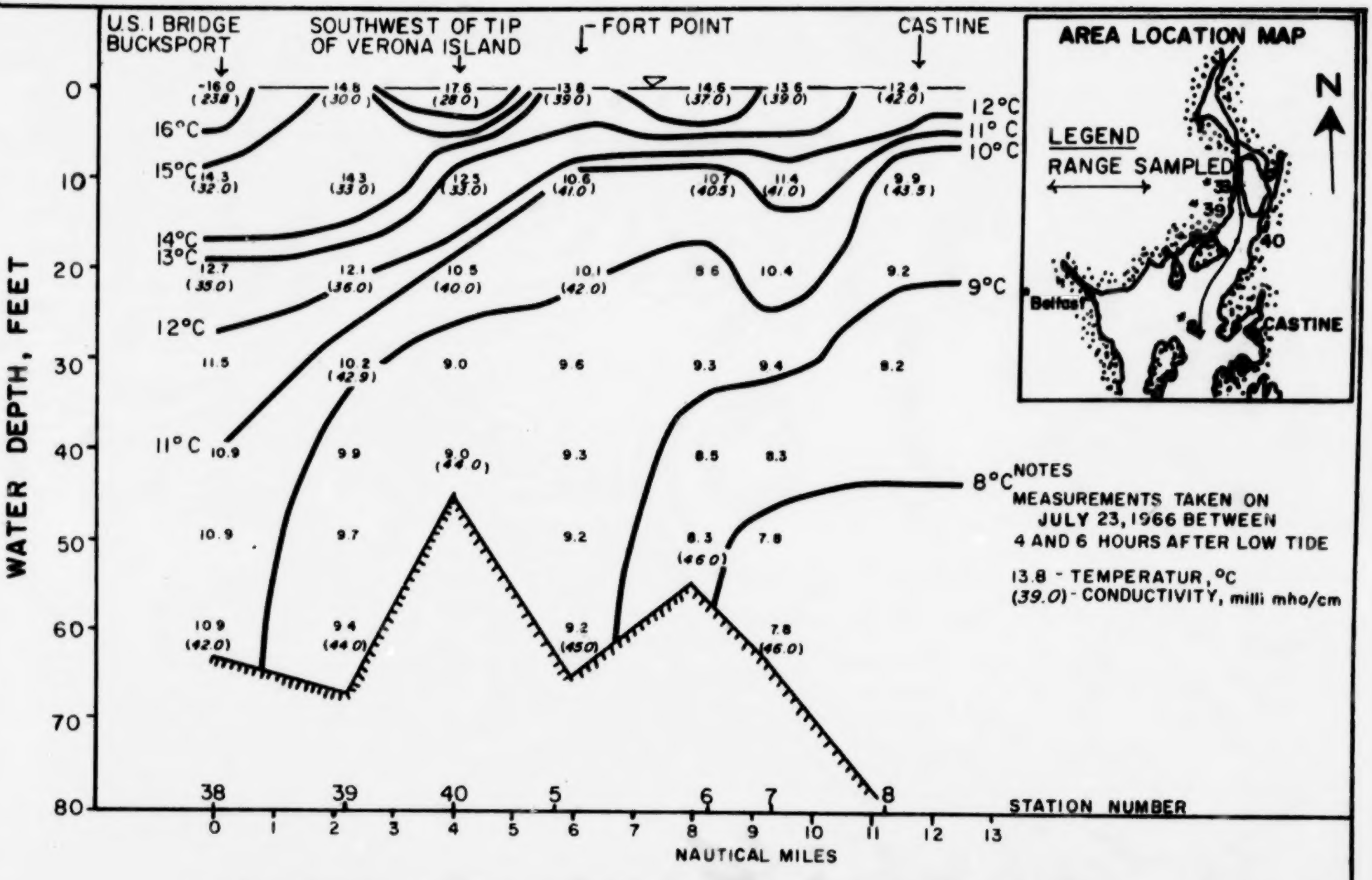
NOTES

15.7 - TEMPERATURE, °C
(39.0) - CONDUCTIVITY, milli mhos/cm

MEASUREMENTS TAKEN ON
JULY 24, 1966 BETWEEN
3 1/2 HOURS TO 4 1/2 HOURS
AFTER LOW TIDE

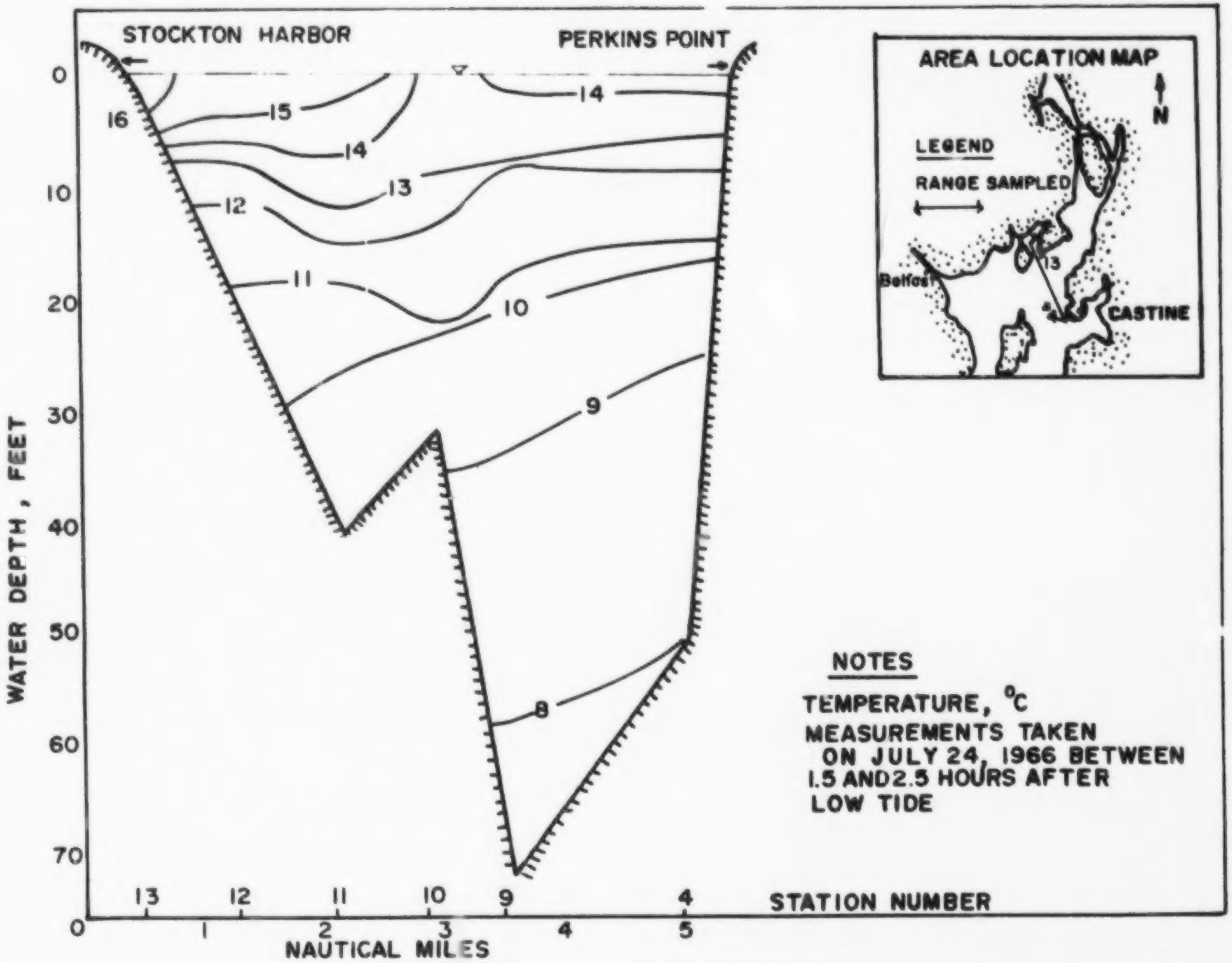
TEMPERATURE AND CONDUCTIVITY IN PENOBSCOT BAY - LONG COVE TO RAM ISLAND

**FIGURE 6**



TEMPERATURE AND CONDUCTIVITY IN PENOBSCOT BAY - BUCKSPORT TO CASTINE

FIGURE 7

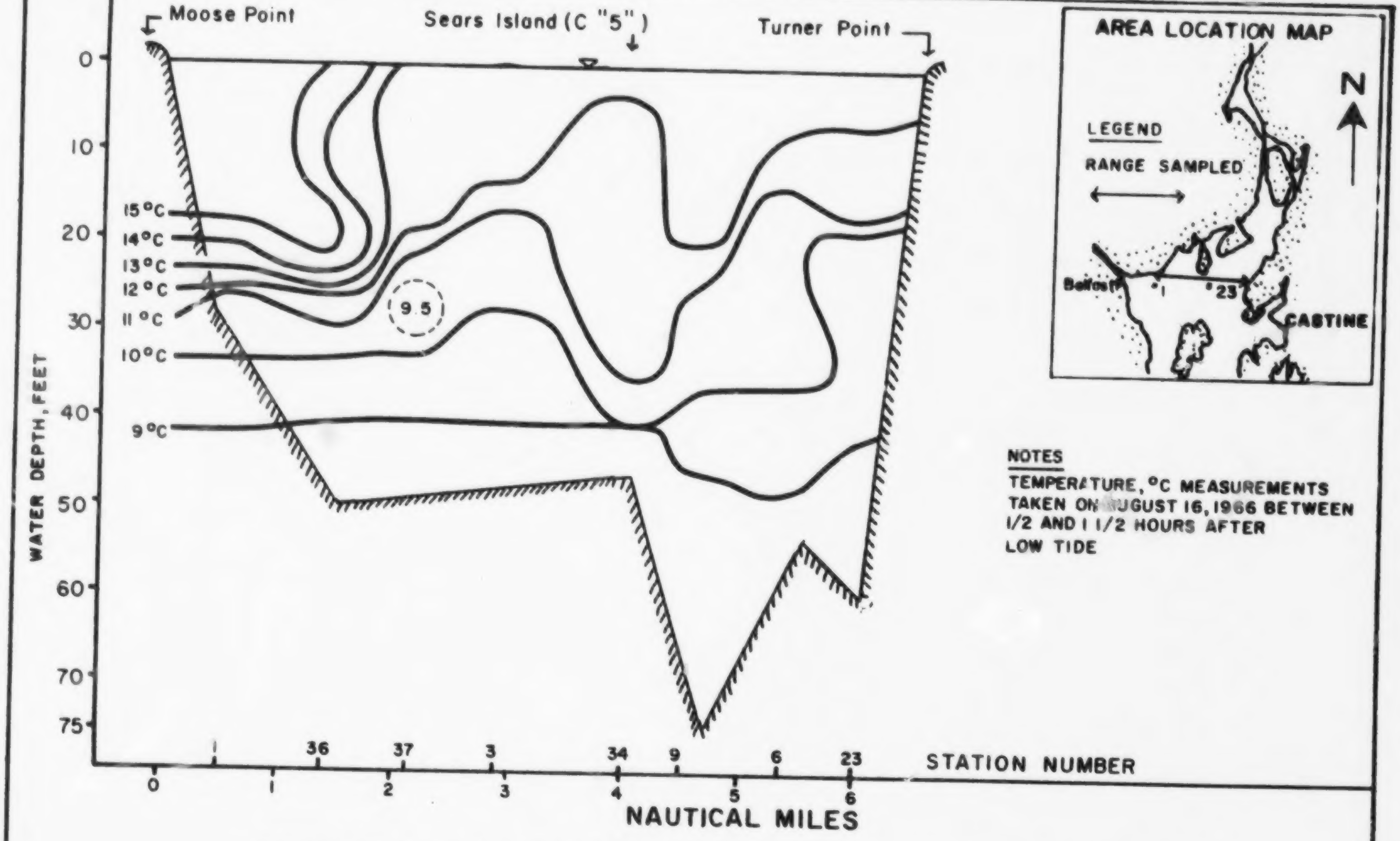


NOTES

TEMPERATURE, °C
MEASUREMENTS TAKEN ON JULY 24, 1966 BETWEEN 1.5 AND 2.5 HOURS AFTER LOW TIDE

FIGURE 8

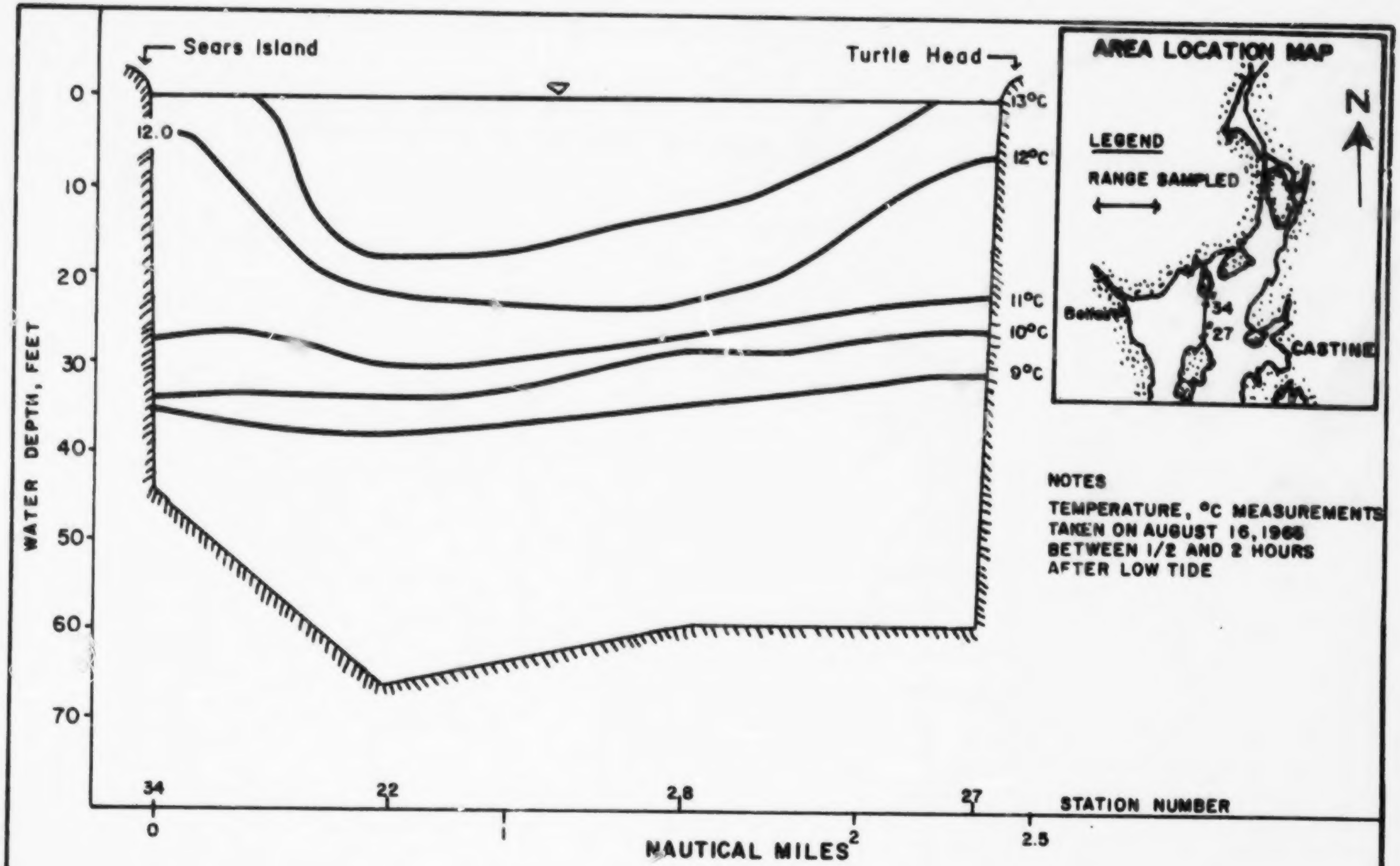
TEMPERATURE IN PENOBSCOT BAY— PERKINS POINT TO STOCKTON HARBOR



NOTES
TEMPERATURE, °C MEASUREMENTS TAKEN ON AUGUST 16, 1966 BETWEEN 1/2 AND 1 1/2 HOURS AFTER LOW TIDE

TEMPERATURE IN PENOBSCOT BAY - MOOSE POINT - TURNER POINT

**FIGURE 9**

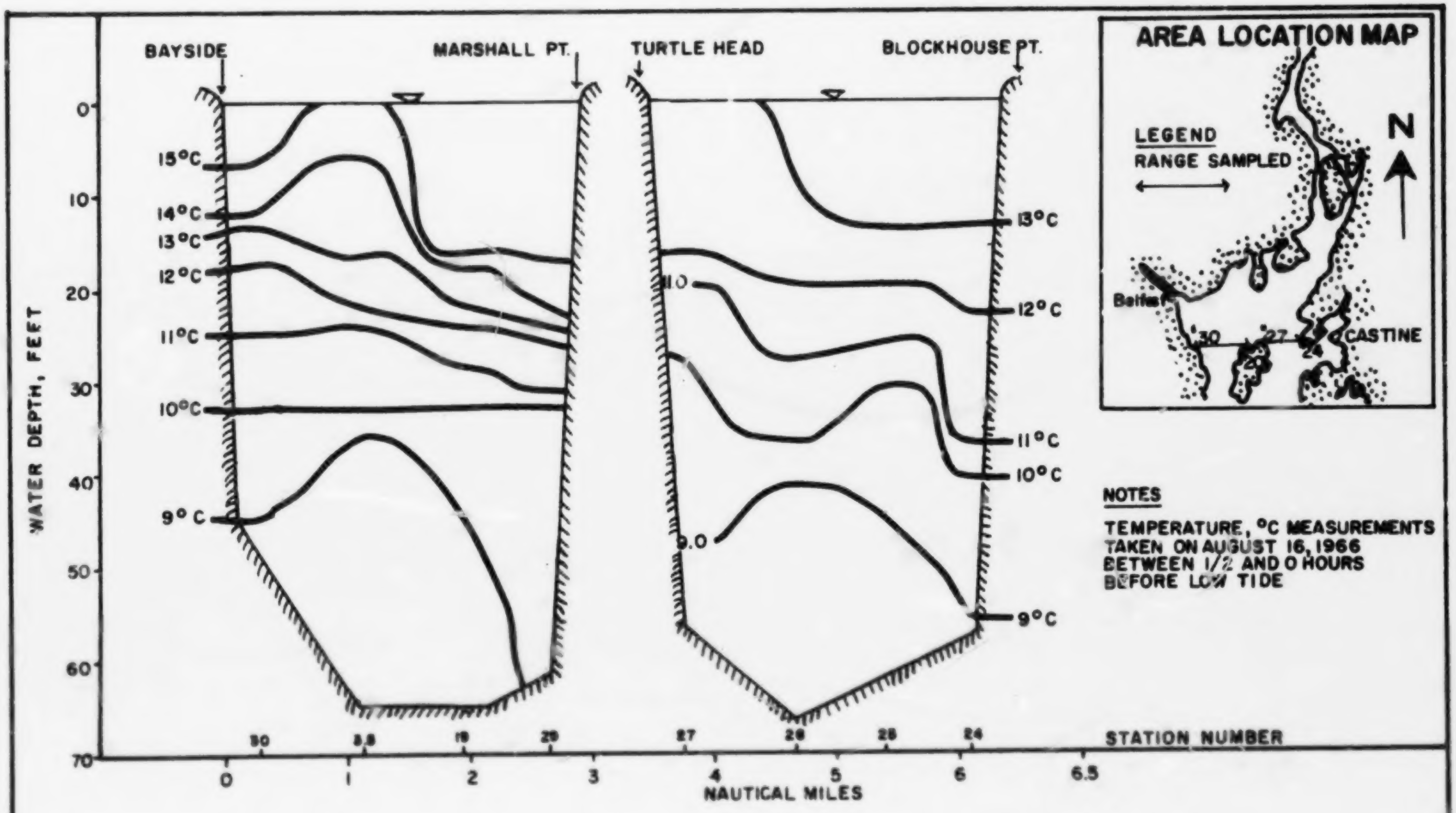


NOTES

TEMPERATURE, °C MEASUREMENTS
TAKEN ON AUGUST 16, 1966
BETWEEN 1/2 AND 2 HOURS
AFTER LOW TIDE

TEMPERATURE IN PENOBSCOT BAY - SEARS ISLAND TO TURTLE HEAD

**FIGURE 10**

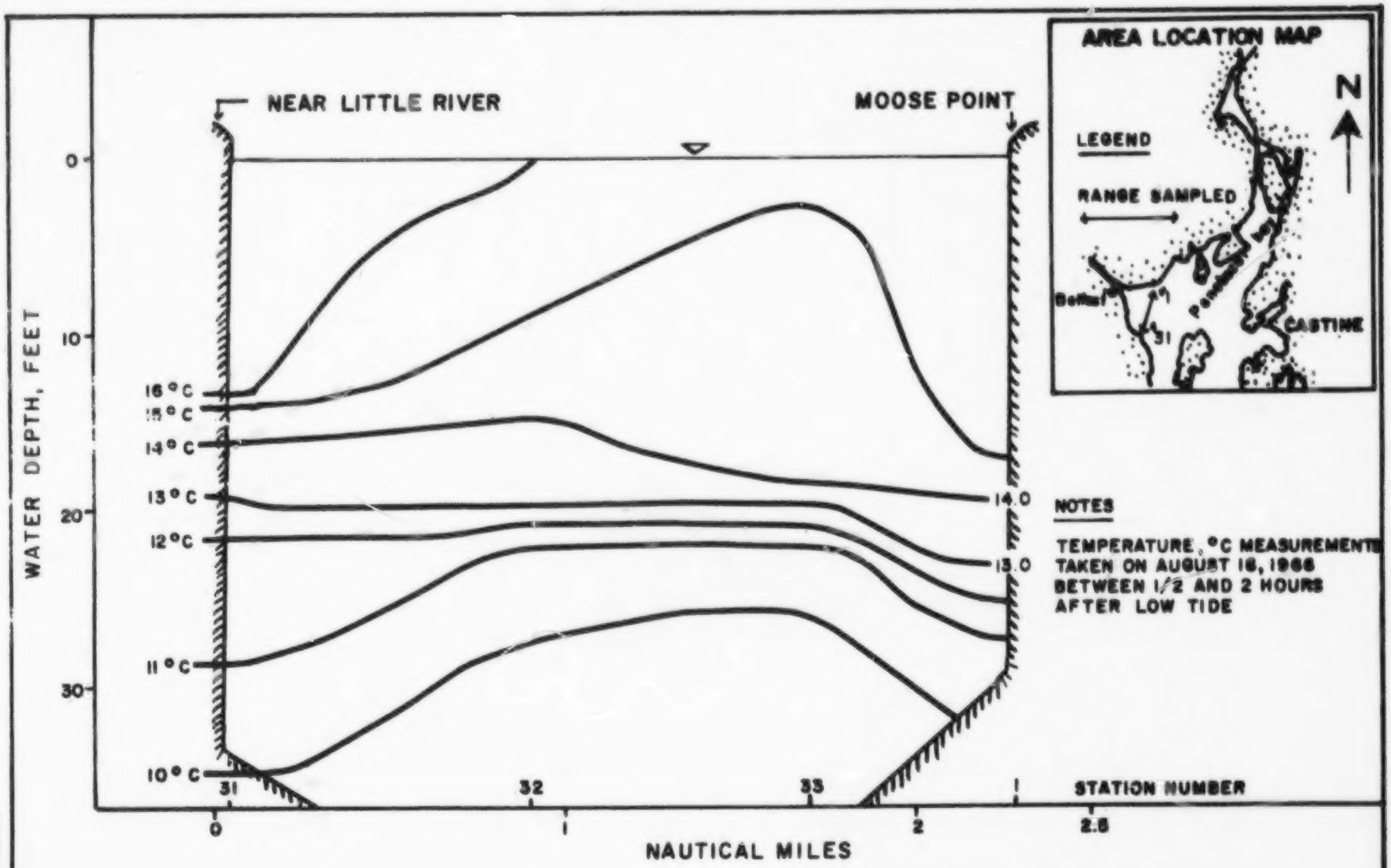


NOTES

TEMPERATURE, °C MEASUREMENTS
TAKEN ON AUGUST 16, 1966
BETWEEN 1/2 AND 0 HOURS
BEFORE LOW TIDE

TEMPERATURE IN PENOBSCOT BAY - BAYSIDE TO BLOCKHOUSE POINT

**FIGURE 11**



NOTES

TEMPERATURE, °C MEASUREMENTS TAKEN ON AUGUST 16, 1966 BETWEEN 1/2 AND 2 HOURS AFTER LOW TIDE

TEMPERATURE IN PENOBSCOT BAY - MOOSE POINT TO POINT NORTH OF BAYSIDE

FIGURE 12

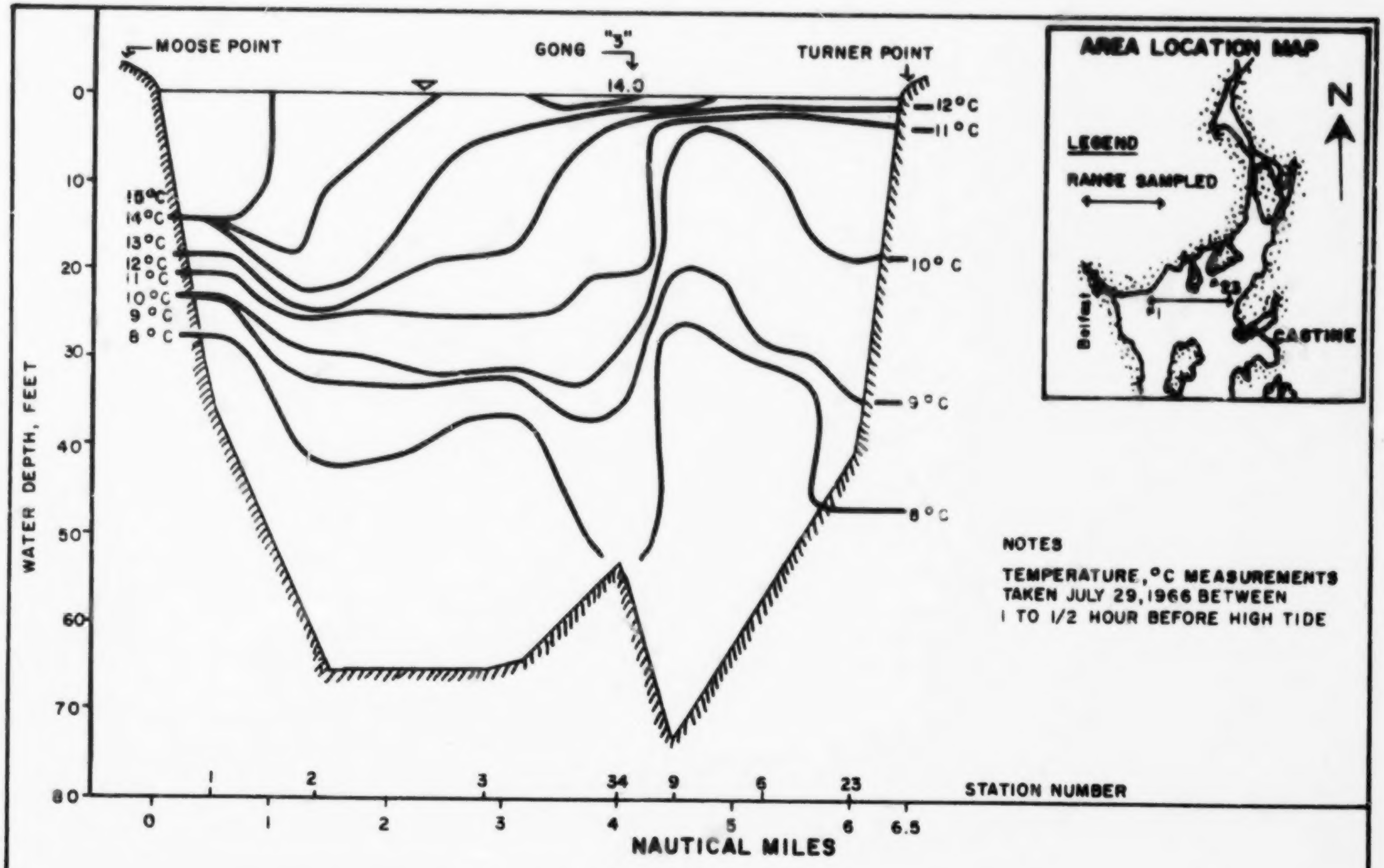
as is shown in Figure 12. Near high tide, Searsport Harbor and Long Cove have a higher temperature (Figure 6) than the open area of Penobscot Bay, indicating that the water has not mixed as much with the cooler sea water. The water temperature is warmer on the west side of Searsport Harbor than on the east side (Figure 13), indicating that cooler water is entering Searsport Harbor on the east side during flood tide.

Warmer water remaining in Stockton Harbor is pushed back into the northeast end as the cooler waters of the mixed Penobscot River are forced into the harbor, as depicted in Figure 8.

Belfast Bay area waters are warmer than the open Penobscot Bay waters near high tide (Figures 13, 14 and 15), indicating that there is not a great transfer of water during each tidal cycle because it takes some time for the water to warm up. One of the characteristics of water is that it does not change its temperature either up or down very easily.

The temperature of the waters between Turtle Head and Sears Island at high tide is nearly uniform (Figure 16), indicating a uniform flow across the area from a similar source.

Temperature and conductivity measurements indicate that the estuary falls in Pritchard's "partially mixed"

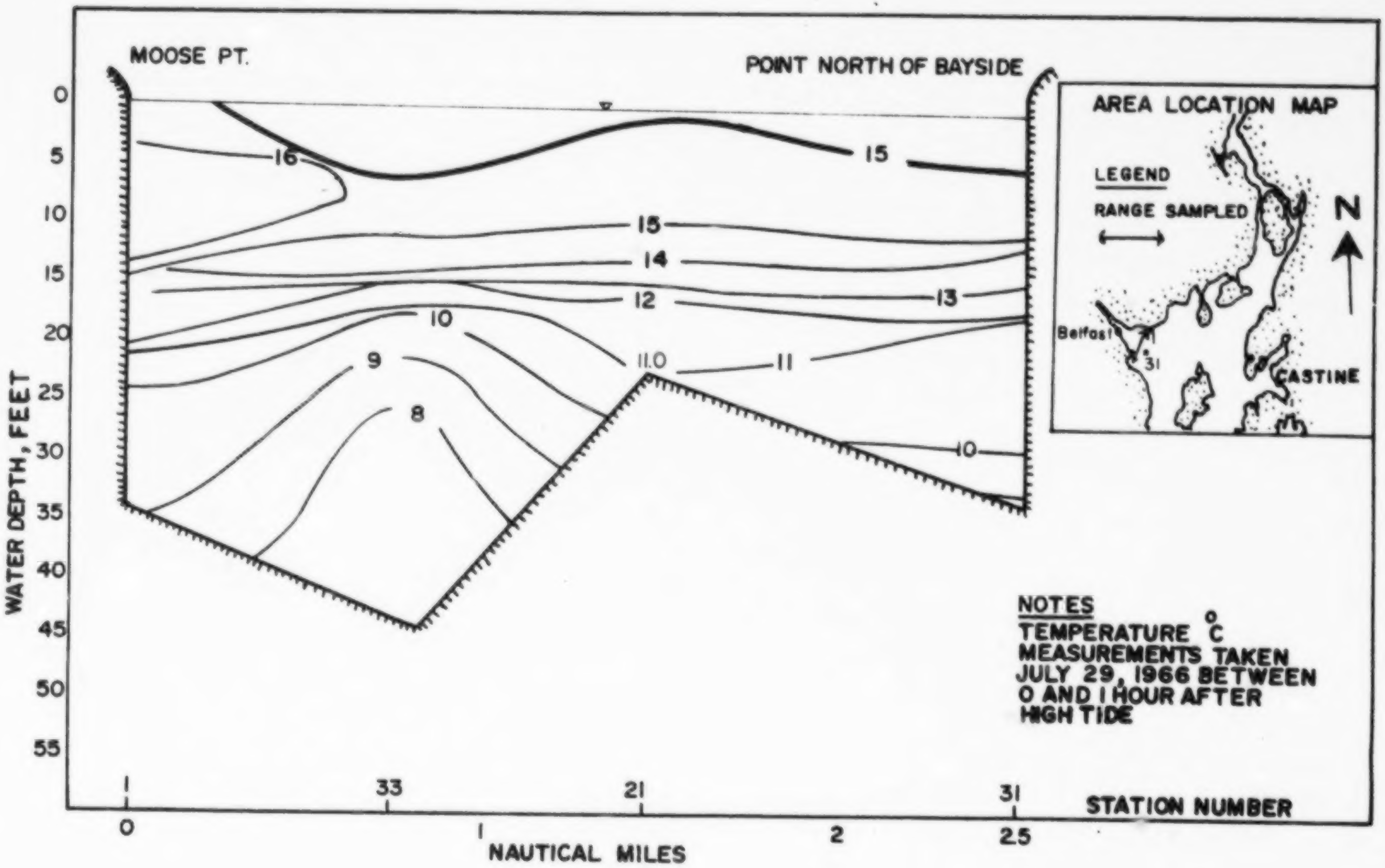


NOTES

TEMPERATURE, °C MEASUREMENTS TAKEN JULY 29, 1966 BETWEEN 1 TO 1/2 HOUR BEFORE HIGH TIDE

TEMPERATURE IN PENOBSCOT BAY - MOOSE POINT TO TURNER POINT

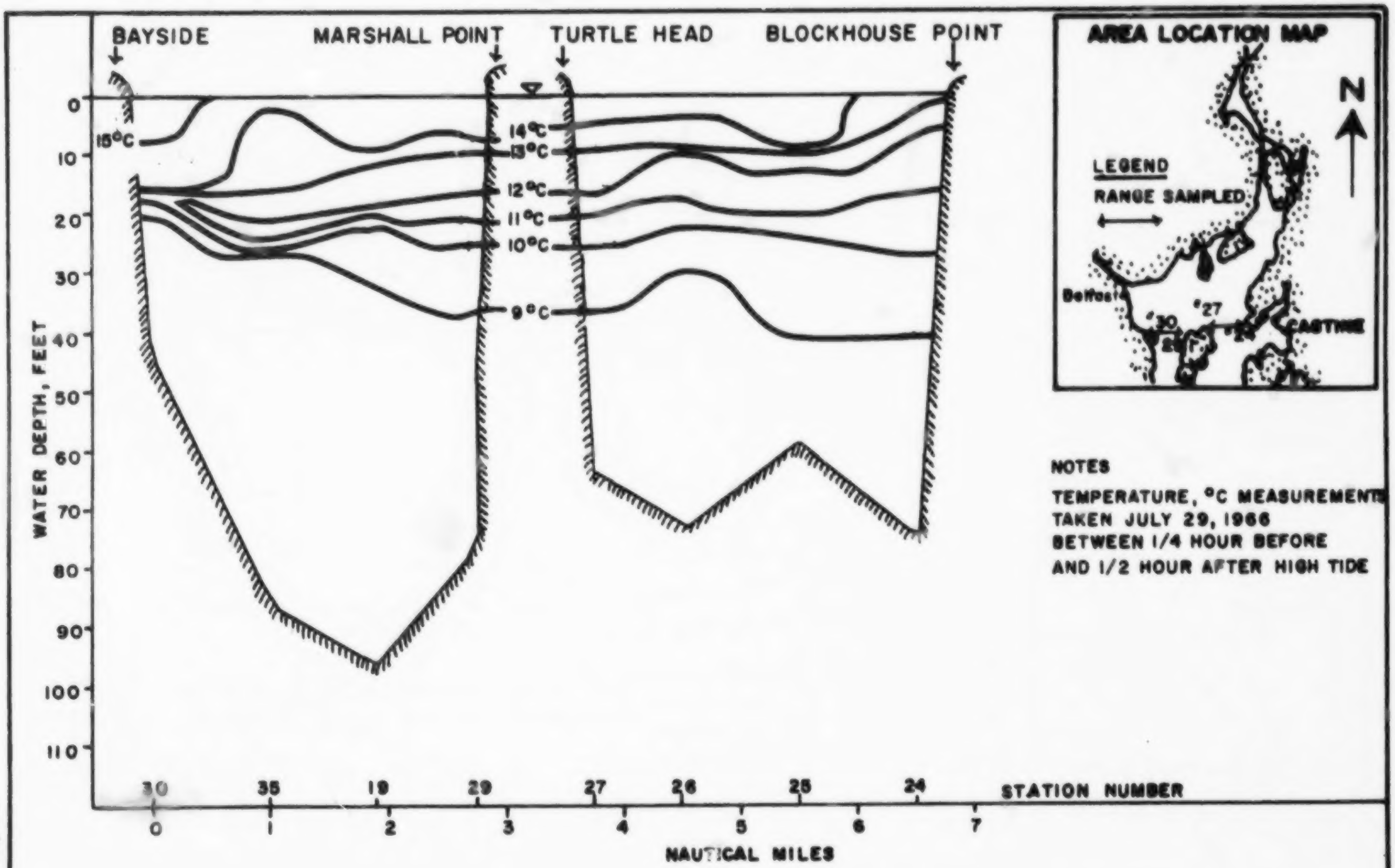
**FIGURE 13**



NOTES
TEMPERATURE °C
MEASUREMENTS TAKEN
JULY 29, 1966 BETWEEN
0 AND 1 HOUR AFTER
HIGH TIDE

TEMPERATURE IN PENOBSCOT BAY— MOOSE POINT TO BAYSIDE

FIGURE 14

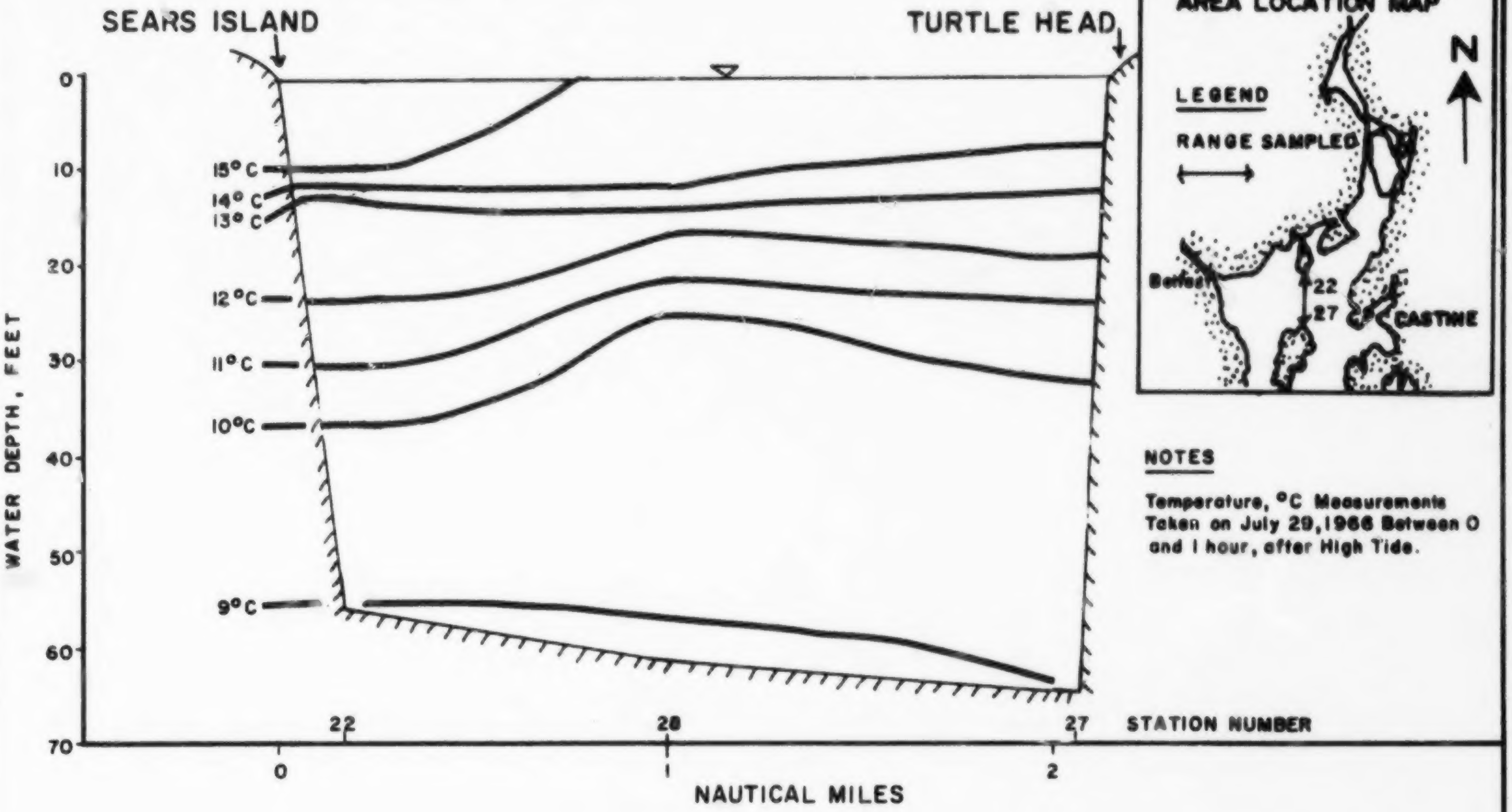


NOTES

TEMPERATURE, °C MEASUREMENTS
TAKEN JULY 29, 1966
BETWEEN 1/4 HOUR BEFORE
AND 1/2 HOUR AFTER HIGH TIDE

TEMPERATURE IN PENOBSCOT BAY - BAYSIDE TO BLOCKHOUSE POINT

FIGURE 15



**NOTES**

Temperature, °C Measurements Taken on July 29, 1966 Between 0 and 1 hour, after High Tide.

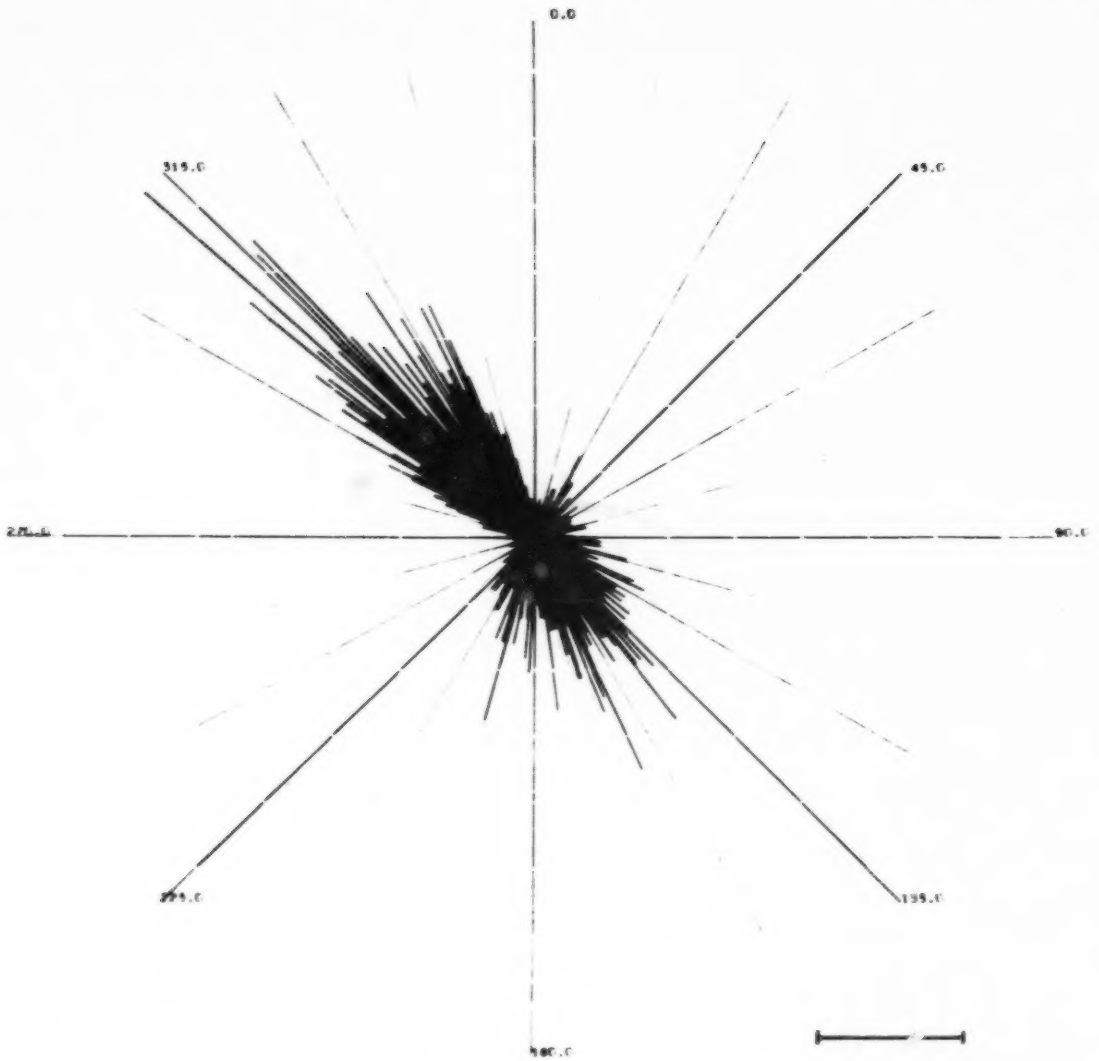
TEMPERATURE IN PENOBSCOT BAY - SEARS ISLAND TO TURTLE HEAD

**FIGURE 16**

class.(1) The dominant salt balance equation terms are longitudinal advection, vertical advection, and vertical diffusion. This class of estuary is noted for flow volumes in both the upper and lower layers up to ten times that of the river entering the head of the estuary.

## WIND

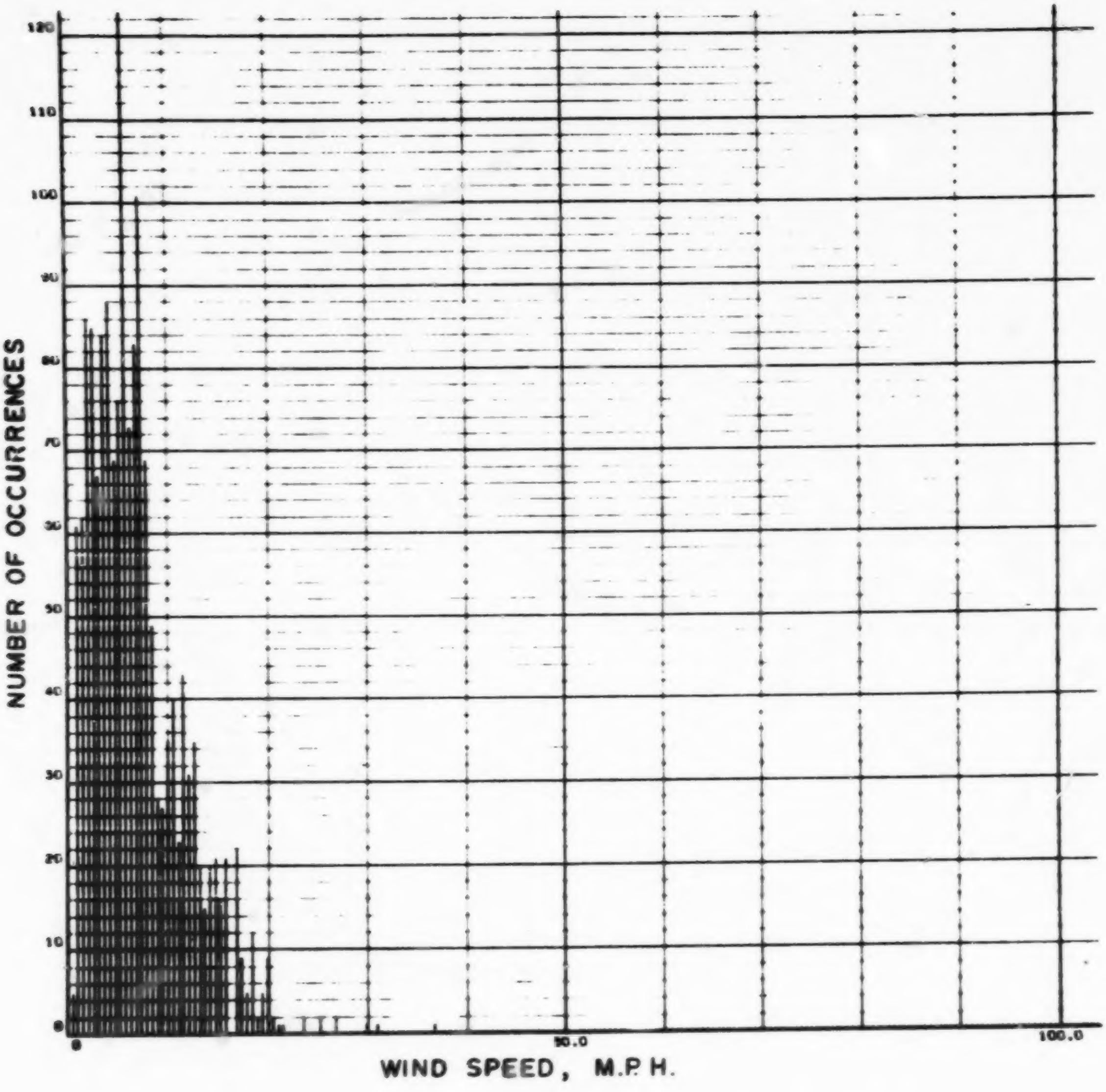
During the study period in July and August 1966 the wind generally blew from either a northwest or a southeast direction. Figure 17 shows on polar coordinates the number of occasions that the wind blew from a certain direction during the period. The direction and speed of wind for each occasion is an average over a 50-second period of time. Recordings occurred once every 20 minutes. The wind blew primarily from a direction of about 320 or 150 degrees. The number of occasions that the wind was a certain speed is shown on Figure 18, which illustrates that about 80 percent of the time the wind was less than 10 miles per hour. A combination of wind speed and direction for each occasion is shown in Figure 19. These data indicate that the wind speed was about the same for both general directions -- northwest or southeast.



1"= 10.6 OCCURRENCES

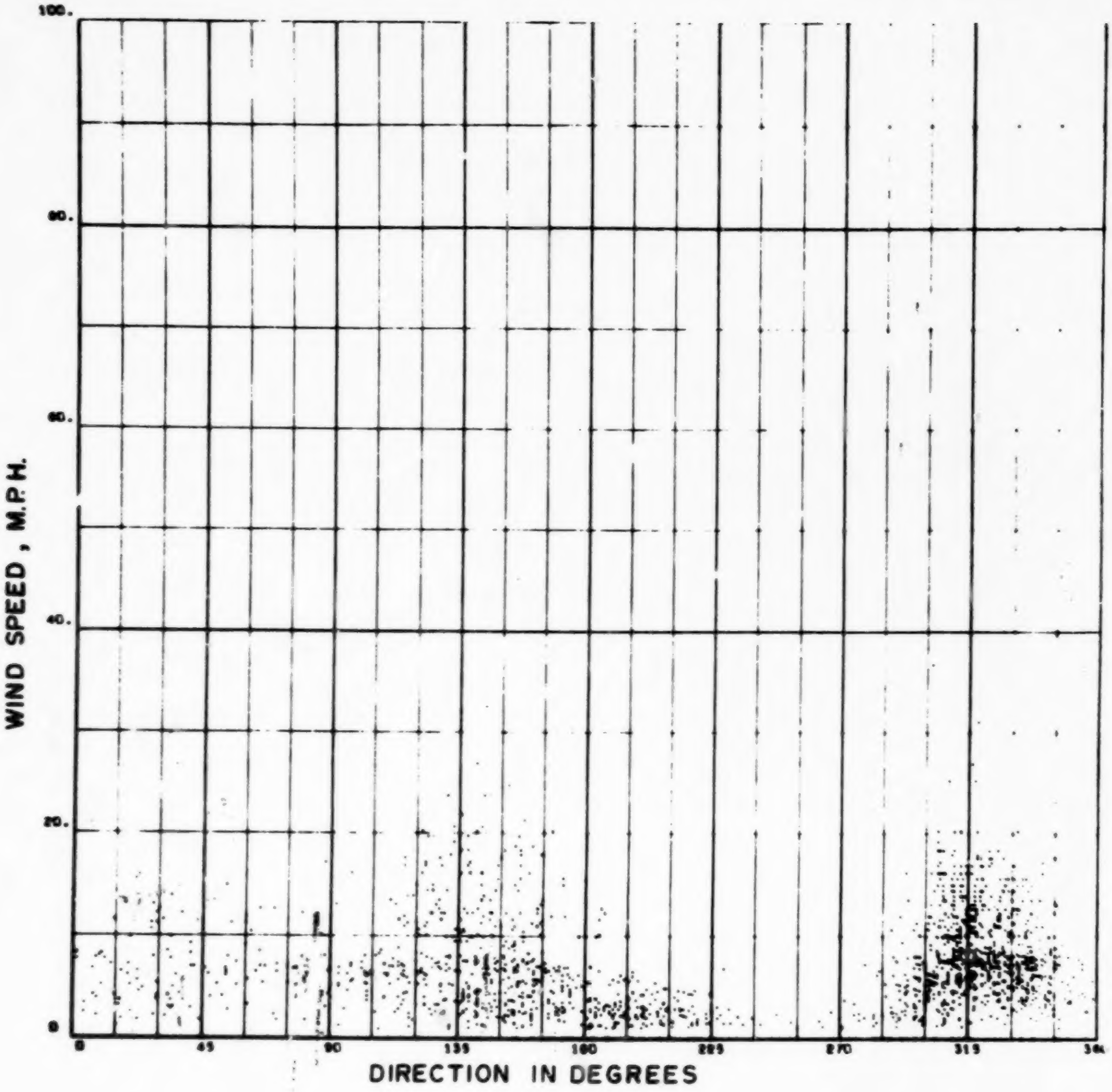
POLAR COORDINATE HISTOGRAM PLOT OF WIND DIRECTION

FIGURE 17



HISTOGRAM OF WIND SPEED

FIGURE 18



PLOT OF WIND SPEED VERSUS DIRECTION

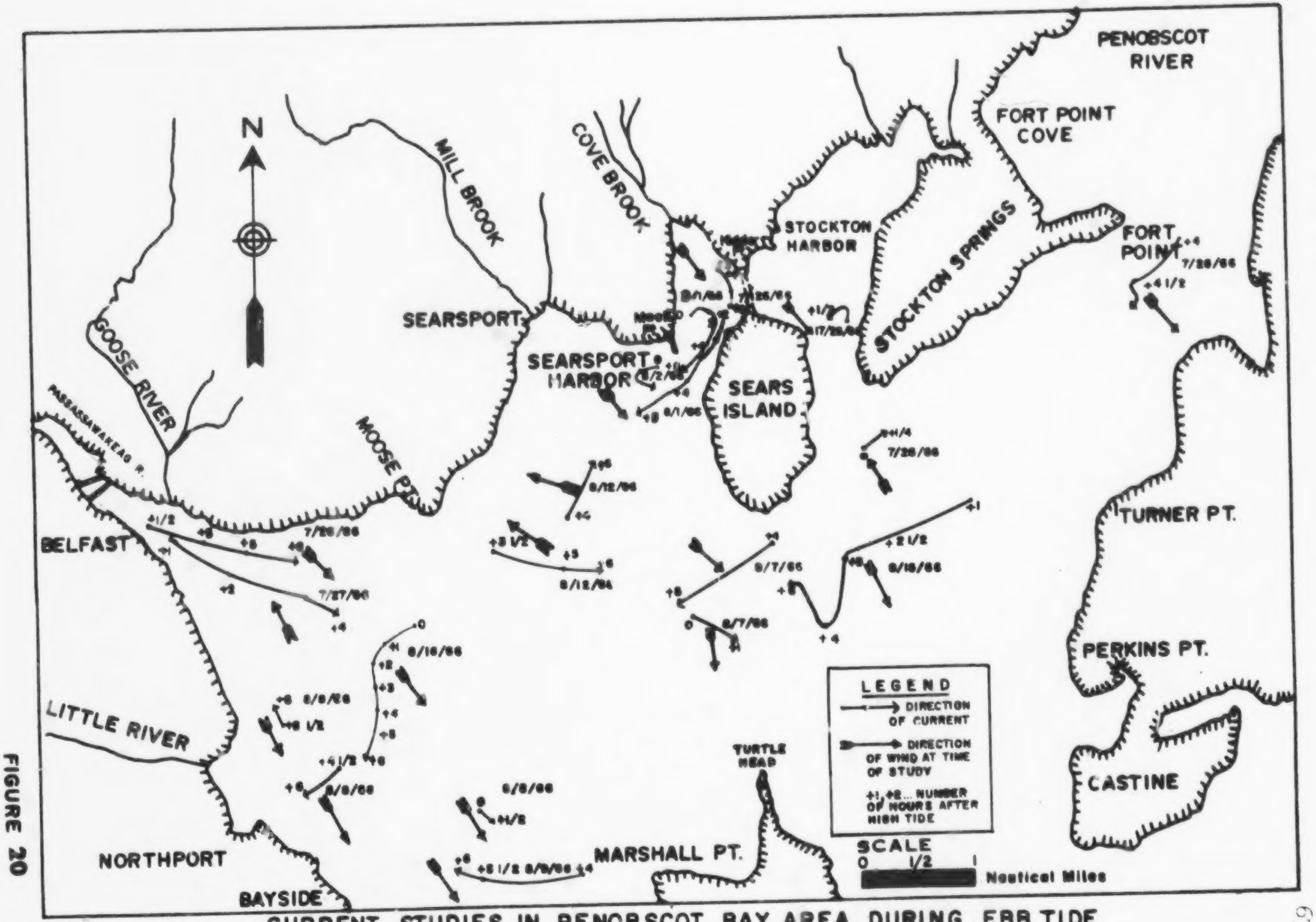
FIGURE 19

## 51 DROGUE OBSERVATIONS

A device called a drogue was used to determine the direction of flow of the surface waters. The drogue, which is 4 feet in depth, was submerged about one-half foot, making the bottom of the drogue 4.5 feet beneath the water surface. The wind direction during the time the drogue was followed in a boat, as well as the direction the drogue was traveling, is shown in Figure 20 for ebb tide and Figure 21 for flood tide. The hours at various locations along the arrows indicate the time after high or low tide.

Drogue observations demonstrate that Penobscot River water enters Stockton Harbor regularly in relatively large quantities with each tide and penetrates well up toward the head.

At high water, the bar connecting Sears Island to Kidder Point on the mainland is submerged to depths of several feet; thus it may be possible for Penobscot River water to enter Long Cove through Stockton Harbor. However, on two occasions, drogues put in near the bar indicated weak and variable currents. Probably the only time a large quantity of Penobscot River water could enter Long Cove through Stockton Harbor would be at a time of strong easterly winds. Since moderate southeast winds occurred frequently


N
PENOBSCOT RIVER
FORT POINT COVE
FORT POINT
STOCKTON SPRINGS
STOCKTON HARBOR
COVE BROOK
MILL BROOK
SEARSPORT
SEARSPORT HARBOR
SEARS ISLAND
GOOSE RIVER
PASSAGASSAWAKEAG R.
MOOSE PT.
BELFAST
LITTLE RIVER
NORTHPORT
BAYSIDE
MARSHALL PT.
TURTLE HEAD
TURNER PT.
PERKINS PT.
CASTINE
7/28/66
7/27/66
8/1/66
8/12/66
8/7/66
8/16/66
8/8/66
LEGEND
DIRECTION OF CURRENT
DIRECTION OF WIND AT TIME OF STUDY
+1, +2... NUMBER OF HOURS AFTER HIGH TIDE
SCALE
0
1/2
1
Nautical Miles

CURRENT STUDIES IN PENOBSCOT BAY AREA DURING EBB TIDE

FIGURE 20

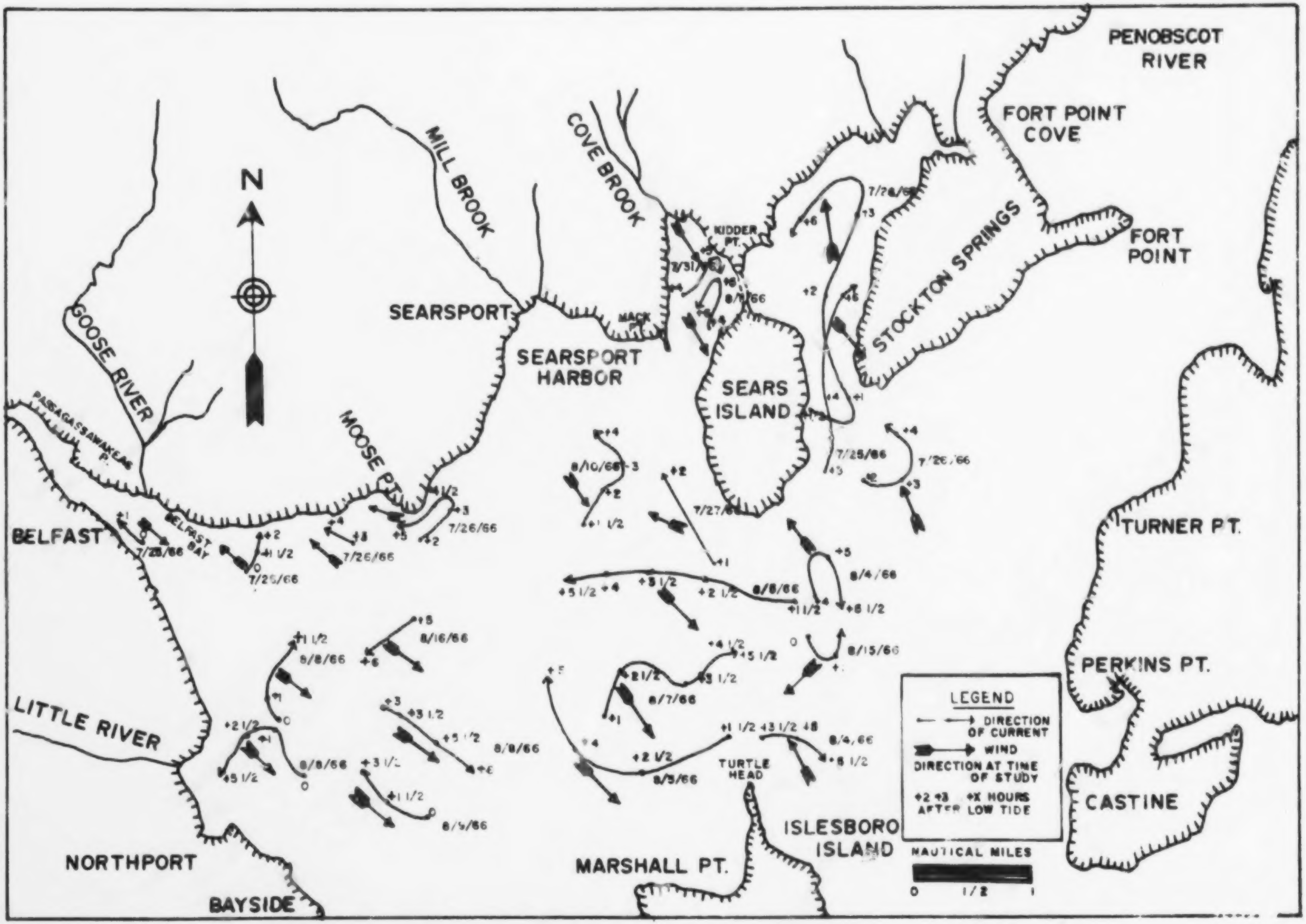

PENOBSCOT RIVER
FORT POINT COVE
FORT POINT
STOCKTON SPRINGS
KIDDER PT.
COVE BROOK
MILL BROOK
SEARSPORT
MACK PT.
SEARSPORT HARBOR
SEARS ISLAND
GOOSE RIVER
PASSAGASSAWAKEAG PT.
MOOSE PT.
BELFAST
BELFAST BAY
TURNER PT.
PERKINS PT.
CASTINE
LITTLE RIVER
NORTHPORT
BAYSIDE
MARSHALL PT.
TURTLE HEAD
ISLESBORO ISLAND
N
7/28/66
7/31/66
8/1/66
7/25/66
7/26/66
8/10/66
7/27/66
8/4/66
8/8/66
8/15/66
8/7/66
8/5/66
8/16/66
8/9/66
LEGEND
DIRECTION OF CURRENT
WIND DIRECTION AT TIME OF STUDY
+2 +3 +X HOURS AFTER LOW TIDE
NAUTICAL MILES
0
1/2
1

FIGURE 21

CURRENT STUDIES IN PENOBSCOT BAY AREA DURING FLOOD TIDE during the period of the field study, one may conclude that it is not common for large amounts of Penobscot River water to enter Long Cove through Stockton Harbor.

Both drogue and temperature data demonstrate that Long Cove has a long flushing time and that Searsport Harbor receives more Penobscot River water on the east side and has less transfer of water on the west side during the tidal cycle.

Most Belfast Bay surface waters near Goose River at ebb tide during the time of study were generally confined to the area inside a line from Moose Point to Little River, as is shown by drogue releases on Figure 20. Some water could possibly reach a line from Mack Point to Bayside in 1/2 tidal cycle if tidal and wind effects are in the same direction.

Although water flowed in both directions on a flood tide between Sears Island and Turtle Head on Islesboro Island, the greatest movement of water in this area was to the west of Sears Island-Turtle Head area, as is shown by the seven drogue studies on Figure 21. Waters from the bay east of the Sears Island-Turtle Head area always entered Stockton Harbor on a flood tide. On ebb tide the Penobscot River water generally flows out on both sides of Islesboro Island, although there are exceptions such as August 7, 1966, when the drogue release indicated that water at the surface flowed to the southeast (Figure 20).

Drogue speeds varied from zero to one nautical mile per hour, the highest being recorded in Stockton Harbor and the Fort Point Narrows. Speeds of 0.4 knots predominated during the course of the study. These are the average speeds over the depth range of 0.5 to 4.5 feet of the water column. Surface speeds may be higher.

Drift bottles were released in Belfast Bay near the mouth of the Passagassawakeag River. Of those found, all but one were washed ashore in Belfast and Northport. The one exception was washed ashore at Blockhouse Point in Castine. The drift bottle found in Castine was released on July 29, 1966, and recovered eight days later on August 6, 1966.

Strong southwesterly winds, beginning at high water slack, would make it possible for Belfast Bay waters to clear Moose Point on the first ebb and enter Searsport Harbor and Long Cove on the succeeding flood. Under these conditions Belfast Bay water would probably also pass over the Sears Island-Kidder Point bar into Stockton Harbor. However, there was no period of strong southwesterly winds during the field study.

H. Pahren

## SULFITE WASTE LIQUOR

Sulfite waste liquor is considered a conservative material since it is difficult to decompose. The concentrations found at the surface in the upper Penobscot Bay area are shown graphically in Figure 22. The values are either from one sample or the average of two samples. The concentrations of sulfite waste liquor in bottom samples were about 1 to 8 parts per million, indicating that the major portion of water at the greater depths was primarily sea water, while the upper waters of the bay originated from the Penobscot River. The Passagassawakeag River above the effects of the tide had a concentration of 3 parts per million, whereas the Penobscot River at the dam in Bangor had a concentration of 260 parts per million sulfite waste liquor.

It is estimated that over 99 percent of the sulfite waste liquor in Penobscot Bay comes from wastes discharged to the Penobscot River. Figure 22 shows that Penobscot River water eventually found its way to every sampling location in the upper Penobscot Bay area.

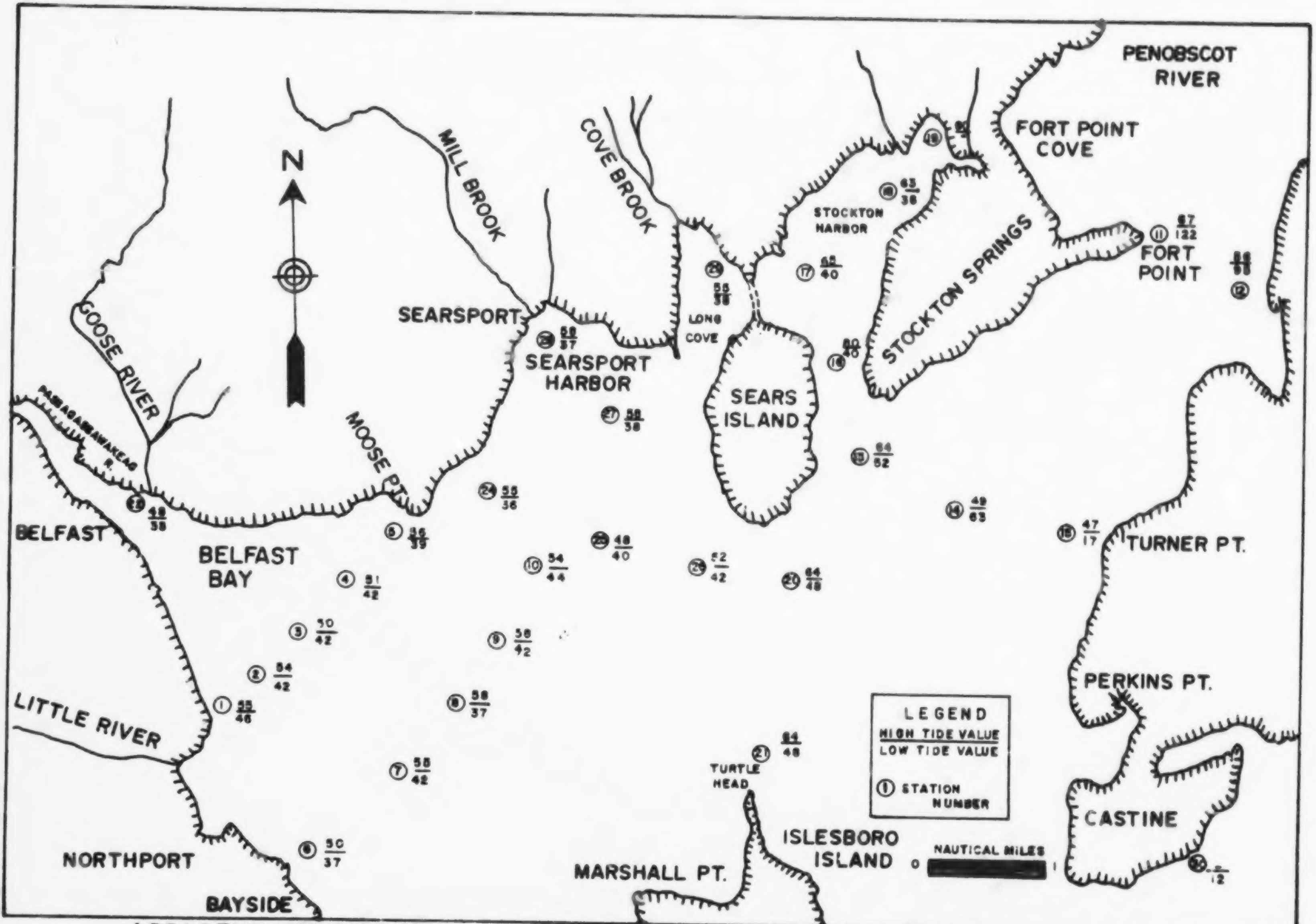

PENOBSCOT RIVER
FORT POINT COVE
FORT POINT
STOCKTON SPRINGS
STOCKTON HARBOR
LONG COVE
SEARS ISLAND
COVE BROOK
MILL BROOK
SEARSPORT
SEARSPORT HARBOR
MOOSE PT.
GOOSE RIVER
PASSAGASSAWAKEAG R.
BELFAST
BELFAST BAY
LITTLE RIVER
NORTHPORT
BAYSIDE
MARSHALL PT.
TURTLE HEAD
ISLESBORO ISLAND
TURNER PT.
PERKINS PT.
CASTINE
N
LEGEND
HIGH TIDE VALUE
LOW TIDE VALUE
① STATION NUMBER
NAUTICAL MILES
0
1
① 55/46
② 54/42
③ 50/42
④ 51/42
⑤ 56/39
⑥ 50/37
⑦ 58/42
⑧ 58/37
⑨ 58/42
⑩ 54/44
⑪ 67/122
⑫
⑬ 64/52
⑭ 49/63
⑮ 47/17
⑯ 60/40
⑰ 62/40
⑱ 63/38
⑲
㉑ 64/48
㉒ 48/38
㉓ 48/40
㉔ 55/36
㉕ 52/42
㉖ 64/48
㉗ 58/38
㉘ 58/37
㉙ 55/38
12

**FIGURE 22**

APPARENT SULFITE WASTE LIQUOR AT THE SURFACE IN PENOBSCOT BAY AREA

## H. Pahren

## WATER USES

The predominant water uses of the lower Penobscot River and Penobscot Bay in the study area at the present time are for shellfish harvesting and industrial use. Cooling water is a major use by the Northern Chemical Company in Searsport. Belfast Canning Co. uses Bay water in its flume to transport fish, while Penobscot Poultry uses it in its process to obtain a vacuum. The Penobscot River and Penobscot Bay are still used to a small extent for ocean shipping.

Salmon fishing was a major industry until the mid-thirties when pollution and dams depleted the salmon population. Lobstering is still conducted in Penobscot Bay.

Bangor, until recently, used the Penobscot River as a water supply, but increasing pollution of the river forced the city to switch to an unpolluted lake supply.

Although the area attracts a large number of tourists, there are very little water-oriented recreational activities available to the public. Belfast Bay at one time had a fairly large boat concentration, but this has been severely reduced in numbers over the years because of odor conditions. As one local resident has said, "People do not like the smell being released from the water and tidal flats."

There was swimming to some extent near Bayside in Northport but recently grease and feathers in the water have made people reluctant to swim.

## CLAM RESOURCES

In past years the Penobscot Bay area has been noted for being one of the most productive areas in Maine for harvesting soft-shell clams. Today, almost all the growing areas in the upper Penobscot Bay are closed due to pollution. In order to determine the amount and value of the clam resources being affected by the pollution, a study was carried out by the Sheilfish Sanitation Branch, United States Public Health Service, during the summer of 1966. The area affected by the pollutional discharges includes the towns of Northport, Belfast, Searsport, Stockton Springs, Penobscot, Castine and Islesboro (Figure 23).

### Methods

Since soft-shell clams were discovered as a food source, the type of equipment used in Maine to harvest them has varied little. The area available for harvesting this resource has also remained the same. The mud flats, or

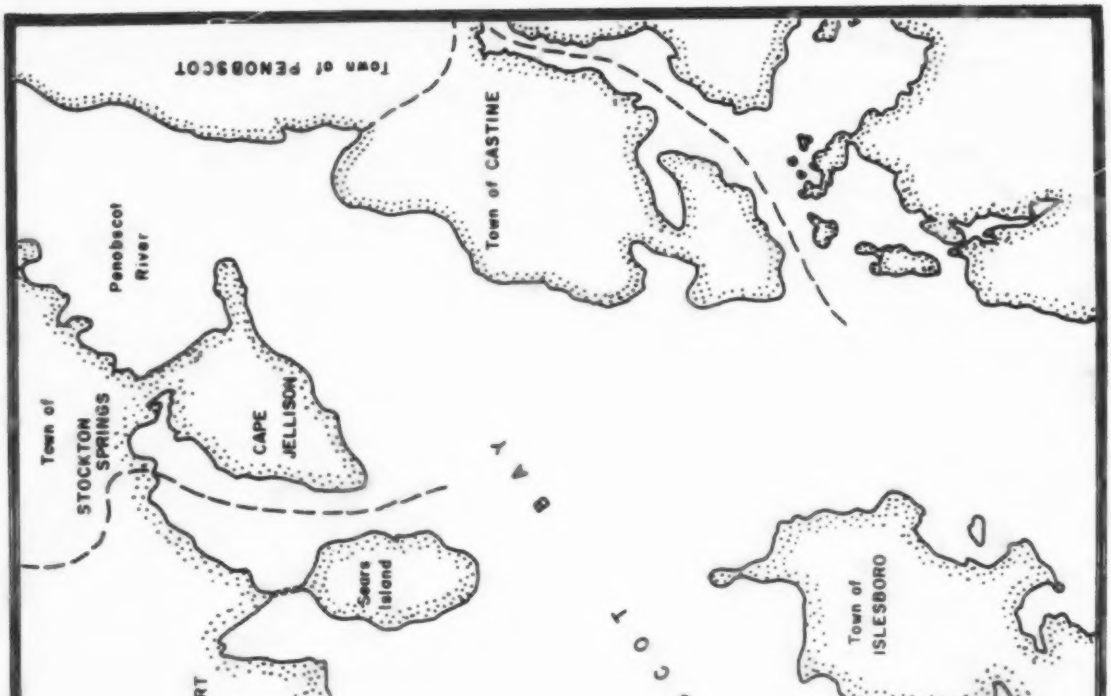

CLAM RESOURCE SURVEY AREA
N
Town of BELFAST
Town of SEARSPORT
Town of STOCKTON SPRINGS
Penobscot River
Town of PENOBSCOT
Town of CASTINE
CAPE JELLISON
Sears Island
PENOBSCOT BAY
BELFAST BAY
Passagassawakeag R.
Town of ISLESBORO
Town of NORTHPORT
NAUTICAL MILES
0
1

FIGURE 23

intertidal zone, provides the entire area of harvest. Soft-shell clams, however, do inhabit some of the bottom below the extreme low water mark, but because of equipment restrictions, imposed by law, they are unavailable to the commercial market. Resource assays within this study area are, therefore, confined to tidal areas available to both the commercial and sports digger and were conducted using a similar type of "hoe" or clam rake.

Although all sizes of clams were collected, only those above 1-1/4 inches were considered in calculating results. The survey was conducted during the period July 17 through August 11, 1966. Estimates of this soft-shell clam resource were acquired by sampling 2,035 stations in 1,000 acres.

Results of the resource survey are reported on a town-by-town basis and contain an estimate of the standing crop of soft-shell clams found within the boundaries of each town. In addition, calculations were made on the potential harvest of this 1966 crop, if the presently restricted areas were opened to commercial digging.

Yield during a second year of harvest (1967) was calculated from an estimated growth rate of 1/2 inch in the size range of 1-1/4 inch to 1-3/4 inch size group. Accordingly, there would be no recruitment into the 1-3/4 inch group from the previous season 1 inch class. Sizes within the 2 inch and 3 inch group were assumed to grow a minimum of 1/4 inches during a growing season which is somewhat less than usual. Projected estimates of recruitment from these sizes, consequently, are low or minimum estimates. The reduction in the second year's standing crop in some cases is half or less than the previous year. This should not, as it appears, give a false impression that a stock is approaching a state of depletion -- the decrease would be caused by the potential cropping off of about 70 percent of the marketable soft-clams accompanied by an estimated 50 percent mortality of the remaining clams, which would result from digging and natural causes. The individual flats should then, with normal digging pressure, reach an equilibrium between recruitment and natural mortality. Percentages of natural and digging mortality were applied from reports from Glube (2) and Dow, Wallace, and Taxiarchis (3) and, when combined, averaged 50 percent per harvest season. Using these factors of recruitment and mortality, estimates were made on the second season's standing crop and the potential value to the fishermen and the community.

Mr. D. E. Wallace of the Maine Department of Sea and Shore Fisheries had determined that a bushel of soft-shell clams has a value of $7.77 to the fisherman, and has calculated that the community value is worth 2.5 times this amount, or $19.43. Mr. Wallace (4) explained how these figures were determined.

> "It is difficult to get a precise accounting of the production of clams in the area because of the many ways in which they are sold locally and the numerous outlets. They are sold to intrastate dealers who operate small shucking houses, to direct customers from roadside 'clam stands,' peddled house to house as well as to the one local interstate shellfish dealer. Because of these local markets in an active tourist area and family income from processing, the 'value added' to the incomes of the producers is considerable. For example, a bushel of clams dug and shucked locally and sold to a restaurant or fried clam stand, and then sold to the consumer, has a consumer value of approximately $50.
>
> "In 1965 there were 32 full-time diggers in the two towns (Stockton Springs-Searsport), digging year-round, and producing 19,200 bushels of clams with an average value of $7.77 per bushel, or a total income to the

"diggers of $149,184.

"From our data, it appears that it is reasonable to consider that the resource value to the community is worth two and one-half times the amounts paid to the digger, or $327,960, plus the value of clams taken in the sports fishery."

Economic studies by the Merrimack River Project on the resource value of clams, in addition to considering factors that Wallace used, also included the effect of shipping the clams in interstate commerce. The data show that the overall market factor can be as high as seven times the value paid to the digger. The potential value of the clam resources, considering the overall market, would thus be $54 per bushel. The 2.5 to 7 market factors would represent the low and high range used for calculating the value of the clams.

The results of the soft-shell clam resources study are summarized on a town basis. Included are descriptions of the area sampled, estimates of standing crop and value of this resource to the community.

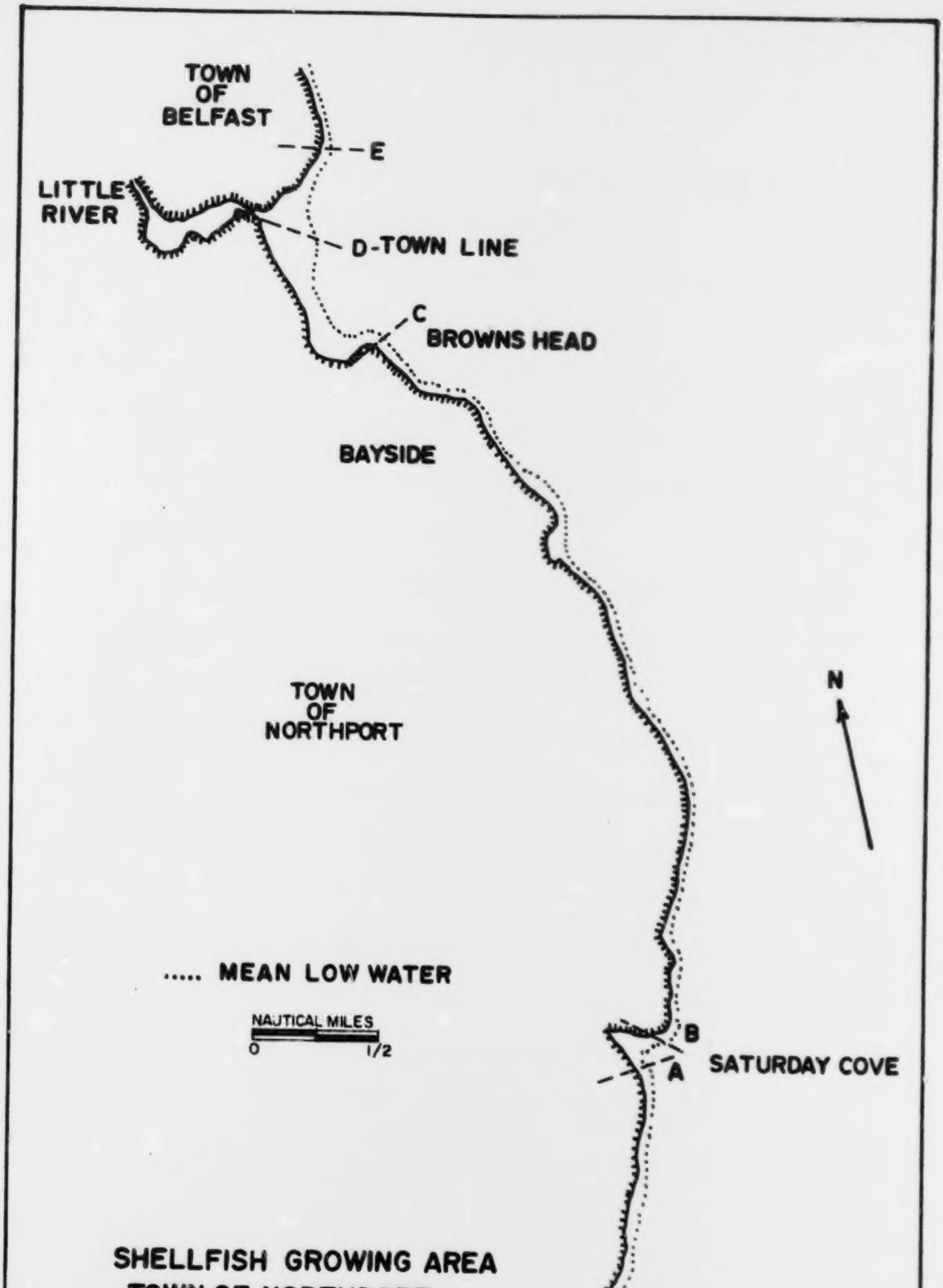
Town of Northport

## Saturday Cove (A - B)

This cove is relatively small and at mean low water, planimeter readings indicate an area of 7 acres. Soft-shell clam producing areas total approximately 5 acres. Twenty-two samples were obtained from this cove and the commercial standing crop is 1,100 bushels with a community value from $21,500 to $59,400. See Figure 24 and Table 5.

## Temple Heights - Bayside (B - C)

The surveyed shoreline between Saturday Cove (b) and Browns Head (C) is composed of a rather narrow intertidal zone strewn with cobbles and rock outcrops. Occasional mussel beds are found throughout the area. Planimeter readings show a potential clam area of 50 acres. Available clam producing areas are calculated to be in the vicinity of 44 acres. Eighty stations were sampled along this stretch and estimates of commercial sized clams totaled 6,400 bushels with a community value from $124,800 to $345,600. See Figure 24 and Table 5.


TOWN OF BELFAST
E
LITTLE RIVER
D-TOWN LINE
C
BROWNS HEAD
BAYSIDE
TOWN OF NORTHPORT
N
..... MEAN LOW WATER
NAUTICAL MILES
0
1/2
B
A
SATURDAY COVE

SHELLFISH GROWING AREA
TOWN OF NORTHPORT

FIGURE 24

## TABLE 5

## PERTINENT DATA USED TO ESTIMATE STANDING CROP FOR INDIVIDUAL AREAS

| AREA | TOWN | SYMBOLS | DATE | NO. OF STATIONS | ACRES | ESTIMATED BU./ACRE | STANDING CROP BUSHELS |
|---|---|---|---|---|---|---|---|
| Saturday Cove | Northport | A - B | 8-8-66 | 22 | 5 | 221 | 1,100 |
| Temple Heights | Northport | B - C | 8-8-66 | 80 | 44 | 146 | 6,400 |
| Little River | Northport | C - D | 8-5-66 | 58 | 45 | 220 | 9,900 |
| Little River | Belfast | D - E | 8-5-66 | 11 | 19 | 105 | 2,000 |
| West Shore | Belfast | E - F | 8-5-66 | 33 | 41 | 101 | 4,100 |
| North Shore | Belfast | G - H | 8-4-66 | 74 | 52 | 190 | 10,000 |
| South Shore | Searsport | H - I | 7-26-66 | 94 | 14 | 60 | 900 |
| Searsport Hb. | Searsport | I - J | 7-25-66 | 75 | 58 | 62 | 3,600 |
| Long Cove | Searsport | K - L | 7-22-66 | 147 | 124 | 71 | 8,800 |
| Stockton Hb. | Searsport | M - N | 7-19,22-66 | 242 | 57 | 131 | 7,500 |
| Stockton Hb. | Stockton Sp. | N - O | 7-29-66<br>7-27-66<br>8-17-66 | 327 | 111 | 177 | 19,600 |
| Cape Jellison | Stockton Sp. | P - Q | 7-29-66 | 68 | 30 | 135 | 4,000 |
| Fort Pt. Cove | Stockton Sp. | R - S | 8-2,3-66 | 534 | 123 | 23 | 2,800 |
| W. Penobscot | Penobscot | 1 - 35 | 8-10-66 | 23 | 27 | 30 | 800 |
| Morse Cove | Penobscot | 36 - 43 | 8-10-66 | 9 | 7 | 89 | 600 |
| Morse Cove | Castine | 44 - 50 | 8-10-66 | 8 | 7 | 89 | 600 |
| East Shore | Castine | 51 - 74 | 8-10-66 | 35 | 24 | 27 | 700 |
| East Shore | Castine | 75 - 126 | 8-11-66 | 60 | 30 | 73 | 2,200 |
| Wadsworth Cove | Castine | 127- 177 | 8-11-66 | 62 | 50 | 85 | 4,200 |
| Turtle Cove | Islesboro | $A_1$- $B_1$ | 8-9-66 | 22 | 15 | 76 | 1,100 |
| Coombs Pt. | Islesboro | $C_1$- $D_1$ | 8-9-66 | 3 | 5 | 314 | 1,600 |
| Parker Cove | Islesboro | $E_1$- $F_1$ | 8-9-66 | 16 | 73 | 46 | 3,400 |
| Coombs Cove | Islesboro | $G_1$- $H_1$ | 8-9-66 | 32 | 36 | 18 | 700 |

## Little River (C - D)

The total area of Little River may be classified as a typical soft-shell clam producing area. The portion surveyed within the Town of Northport lies between Brown's Head (C) and the Belfast-Northport town line (D) originating at the entrance to Little River. The boundary line continues across the flat in an east-southeast direction. There are about 54 acres found within this clam producing area. During the survey, quantities of mussels and eel grass were encountered as well as rock outcrops which necessitated lowering the available acreage to 45. A total of 58 samples were collected on this flat and estimates indicated a harvestable standing population of 9,900 bushels with a community value from $192,400 to $534,600.

## Conclusion

Results of this recent soft-shell clam resource survey in the Town of Northport show a total standing crop of 17,400 bushels of commercially sized clams. This harvest would provide a value to the community from $338,700 to $939,600.

Harvest during the following season, however, would be less because of natural and digging mortalities and overall poor recruitment of small clams into the fishery. The estimated harvestable standing crop would be 8,400 bushels with a community value from $164,000 to $453,600.

## Town of Belfast

### Little River (D - E)

This portion of Little River is quite similar in condition to that encountered in the Town of Northport. There are considerably less clam producing areas available (19 acres) and fewer patches of mussels and eel grass. A total of 11 samples were collected from this flat and estimates indicate a commercial standing crop of 2,000 bushels with a community value from $38,800 to $108,000. See Figure 25 and Table 5.

### Belfast, West Shore (E - F)

The area between Little River Cove (E) and the beginning of the industrial center in the city of Belfast (F) consists of a relatively narrow band of intertidal zone composed of 45 acres of clam producing flats. This total area was reduced to 41 acres to account for the numerous rock outcrops and general array of cobble size stones within the area. Thirty-three (33) samples were collected along this expanse and estimates indicate a commercial standing crop of 4,100 bushels with a community value from $80,500 to $221,400.

Belfast, North Shore (G - H)

The available soft-shell clam producing areas found along the north shore of Belfast are very similar in character to those of the west shore except for a few distinct areas of larger exposed flats -- one of which was found in the western extremes near the abandoned bridge (G), and the other close to the Belfast-Searsport town line (H). See Figure 25.

Planimeter readings showed 74 acres of intertidal zone between the location points G-H. Of these only 52 acres can be considered available for clam production. This reduction in available acreage may be accounted for by the abundance of scattered rocks and rock outcrops found along this stretch of beach. Between these acres there are usually spotty clam flats containing fair populations of clams. Estimates from 74 samples indicate a standing crop of 10,000 bushels of commercial clams valued from a community standpoint at $192,000 to $540,000. See Table 5.

Conclusion

Results of this soft-shell clam resource survey in the Town of Belfast show a total standing crop of 16,100

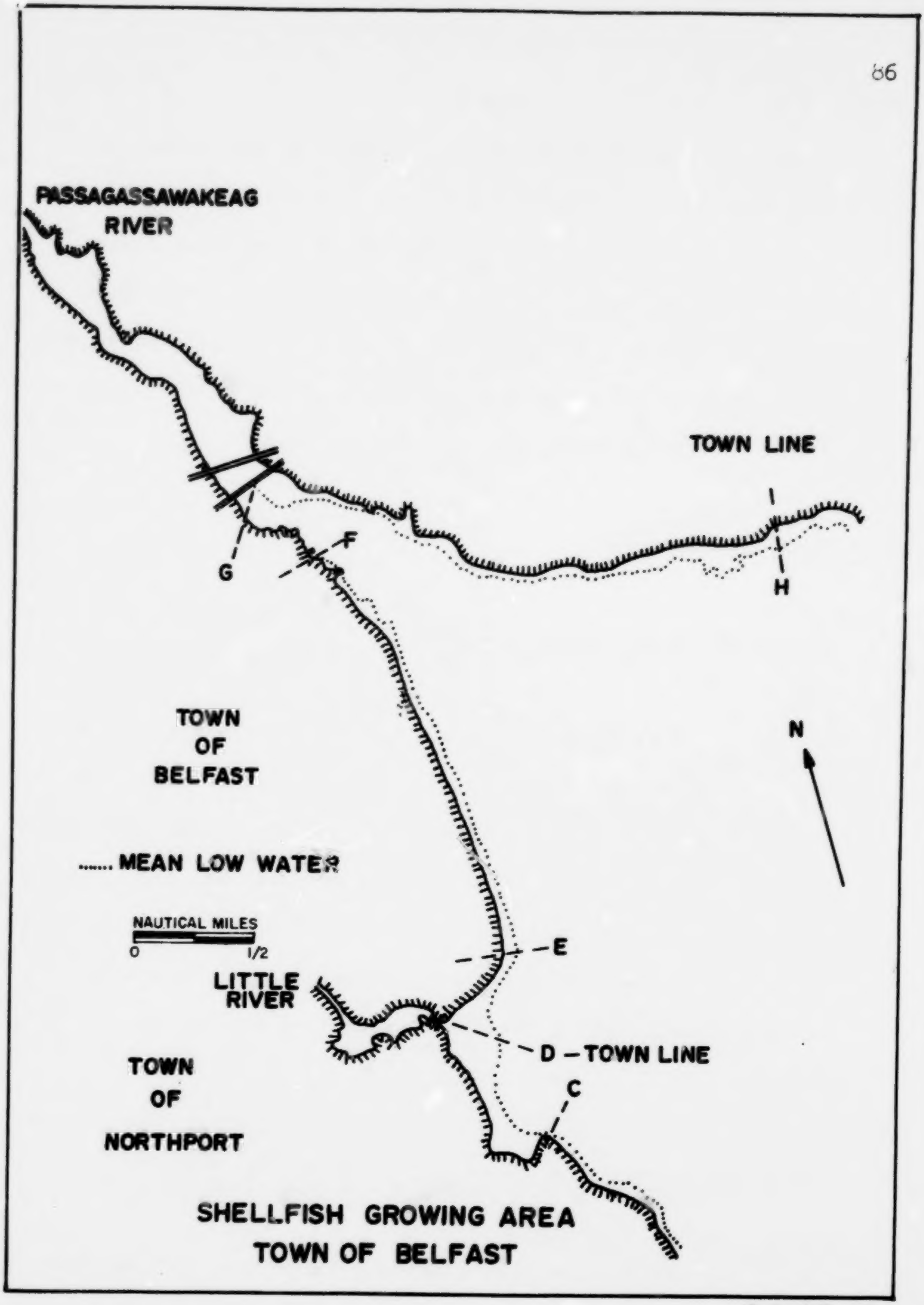

PASSAGASSAWAKEAG
RIVER
TOWN LINE
G
F
H
TOWN
OF
BELFAST
N
....... MEAN LOW WATER
NAUTICAL MILES
0
1/2
E
LITTLE
RIVER
D – TOWN LINE
C
TOWN
OF
NORTHPORT
SHELLFISH GROWING AREA
TOWN OF BELFAST

FIGURE 25

bushels of commercial clams with a value to the community from $311,300 to $869,400.

The second year of harvest on these same flats would be relatively less, due to mortality and recruitment into the fishery. Estimates of standing crop would be in the vicinity of 9,400 bushels of commercial sized clams valued from a community standpoint at $183,000 to $507,600.

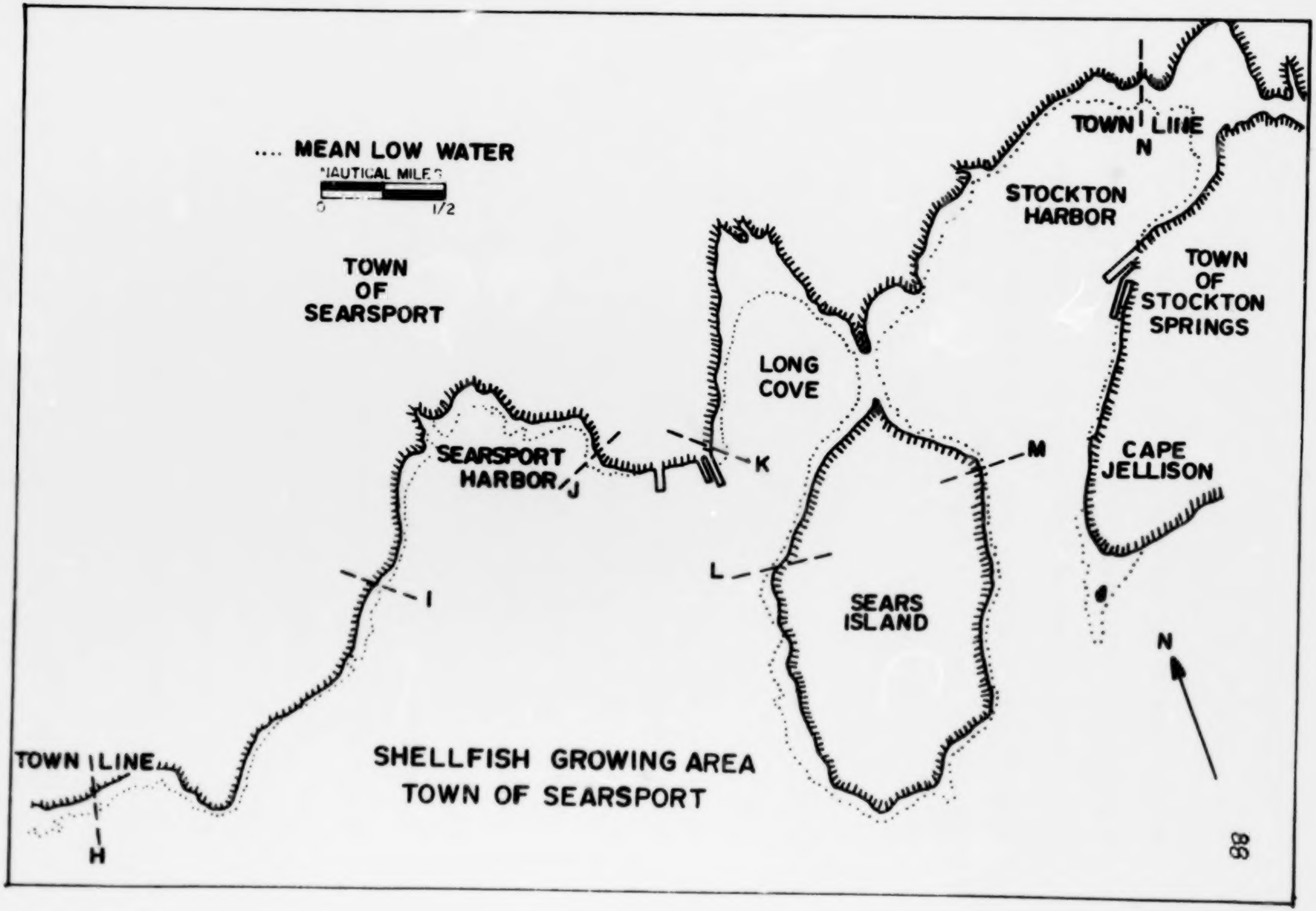
## Town of Searsport

### Searsport, South Shore (H - I)

This stretch of shoreline is characterized by a narrow band of intertidal flats extending for about a mile and a half in an easterly direction from the Belfast-Searsport line (Figure 26). The total expanse of flats has been reduced because of terrain features from 22 to 14 acres. Calculations made from 94 samples indicated a commercial standing crop of 900 bushels with a community value from $16,400 to $48,600.

### Searsport Harbor (I - J)

This harbor is relatively large and, at mean low



.... MEAN LOW WATER
NAUTICAL MILES
0
1/2
TOWN OF SEARSPORT
SEARSPORT HARBOR
LONG COVE
STOCKTON HARBOR
TOWN LINE
N
TOWN OF STOCKTON SPRINGS
CAPE JELLISON
SEARS ISLAND
TOWN LINE
H
I
J
K
L
M
N

SHELLFISH GROWING AREA
TOWN OF SEARSPORT

FIGURE 26

water, planimeter readings indicate that it has an intertidal zone of 85 acres. From this total, soft-clam producing areas were reduced to approximately 58 acres. Seventy-five samples were collected from this harbor and calculations indicate a commercial standing crop of 3,600 bushels having a value from $70,000 to $194,400 to the community.

### Long Cove (K - L)

The intertidal zone of Long Cove beginning at the eastern edge of the industrial complex (K) expands in its northern section into a typical clam flat (Figure 26). Proceeding in a southerly direction, the flat narrows at the northern tip of Sears Island and continues in a similar manner to point (L) on the western shore. Readings made from nautical charts show the intertidal zone within this area to be 158 acres. The survey indicated a potential clam producing area of 124 acres. One hundred and forty-seven (147) stations were sampled along this stretch of beach and cove. Estimates of commercial sized clams totaled 8,800 bushels with a community value from $171,000 to $475,200.

### Stockton Harbor (M - N)

The intertidal zone between control points (M) on Sears Island and (N) at the Searsport-Stockton Springs town line is distinguished by narrow bands interrupted by occasional coves. At the extreme northeast end (N), the tidal zone has a tendency to widen into a characteristic clam flat. Mechanical measurements on nautical charts give a total of 72 acres of intertidal zone. After deducting nonproducing areas from the total, the area of clam producing flats was found to be about 57 acres.

Rocky outcrops, mussel beds, and a chemical dumping area in the southwest section accounted for this reduction. A harvestable standing crop of 7,500 bushels of soft-shell clams having a community value from $145,000 to $405,000 was estimated for this section from 242 stations in 57 acres.

## Conclusion

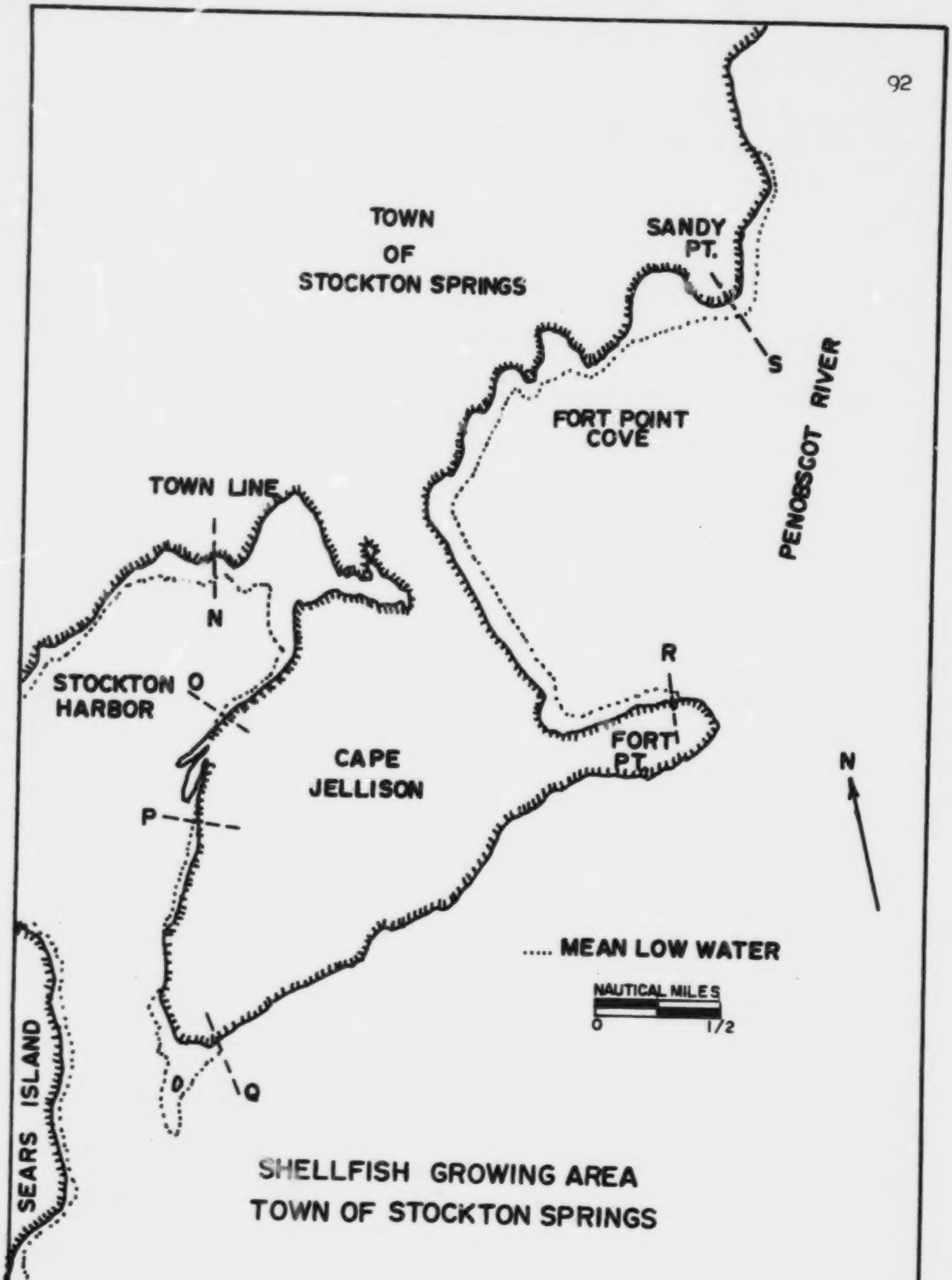
Resource estimates show that the Town of Searsport is endowed with a fair amount of clam producing areas stocked with abundant quantities of shellfish.

An immediate opening of this bed would greatly enhance the economy of the town as there are 20,800 bushels of harvestable clams available. Estimates of the present value of this resource to the community are high and in the vicinity of $402,400 to $1,123,200. Estimates of the standing crop in the second year are 6,200 bushels of commercial sized clams having a value of $120,000 to $334,800.

Town of Stockton Springs

## Stockton Harbor (N - O)

The portion of Stockton Harbor in the Town of Stockton Springs may be classified as a typical clam flat in all respects. The intertidal zone is extensive and not unduly cluttered with rock outcrops or mussel beds. The total available intertidal area between the control points (N - O) has been mechanically estimated at 115 acres. Of this acreage, only four acres were deducted from the total because of rocky outcrops. Mussel beds are in evidence in some places but most are located below the low tide mark. Shellfish samples at 327 stations place the standing crop of commercial clams at 19,600 bushels. The resulting community value is estimated at $381,700 to $1,058,400. It appears that this cove is the most highly productive of all areas surveyed during the study. See Figure 27.


TOWN
OF
STOCKTON SPRINGS
SANDY PT.
S
FORT POINT COVE
PENOBSCOT RIVER
TOWN LINE
N
STOCKTON HARBOR
O
CAPE JELLISON
P
R
FORT PT.
N
..... MEAN LOW WATER
NAUTICAL MILES
0
1/2
Q
SEARS ISLAND

SHELLFISH GROWING AREA
TOWN OF STOCKTON SPRINGS

FIGURE 27

## Cape Jellison (P - Q)

The intertidal zone between control points (P - Q) provides a very limited area for clam production except the small extension at the southern tip of Cape Jellison. A sheer rock outcrop along the shore in one section of this coast is completely void of suitable clam producing bottom. Mechanical estimates of available intertidal zone within this area is placed at 33 acres. Rock outcrops and scattered boulders reduce the total clam producing areas to 30 acres. Clam population appeared to be somewhat spotty throughout this area. Sixty-eight (68) samples were collected within this study area, and calculations showed the commercial standing crop of clams to be 4,000 bushels with a value to the community from $78,700 to $216,000.

## Fort Point Cove (R - S)

The intertidal zone within this study area is rather extensive and results from a reasonably broad band along the northeast shore of Cape Jellison which expands into coves as it approaches Sandy Point (S). See Figure 27. Mechanical estimates on the available tidal zone made from nautical charts gives a figure of 167 acres. The rocky outcrops between the several secondary coves reduces this total clam producing area to 123 acres. A standing crop estimate derived from 534 shellfish samples indicated that there are approximately 2,800 bushels of commercial sized clams populating the area with a community value from $55,000 to $151,200. See Table 5.

## Conclusion

Results of this survey show that a population of 26,400 bushels of commercial size soft-shell clams inhabit the growing areas along the shoreline of Stockton Springs. This standing crop of shellfish would, on an overall basis, benefit the community by a sum of $515,400 to $1,425,600.

Projected figures for standing crop and value, providing the harvest was continued into a second year, show that the estimated potential clam population would be $11,100 bushels of marketable shellfish with a value to the community of $215,000 to $599,400.

## **Town of Penobscot**

### West Penobscot (Stations 1 - 35)

The intertidal zone between Stations 1 - 35 is a narrow band which was estimated at 30 acres. See Figure 28.

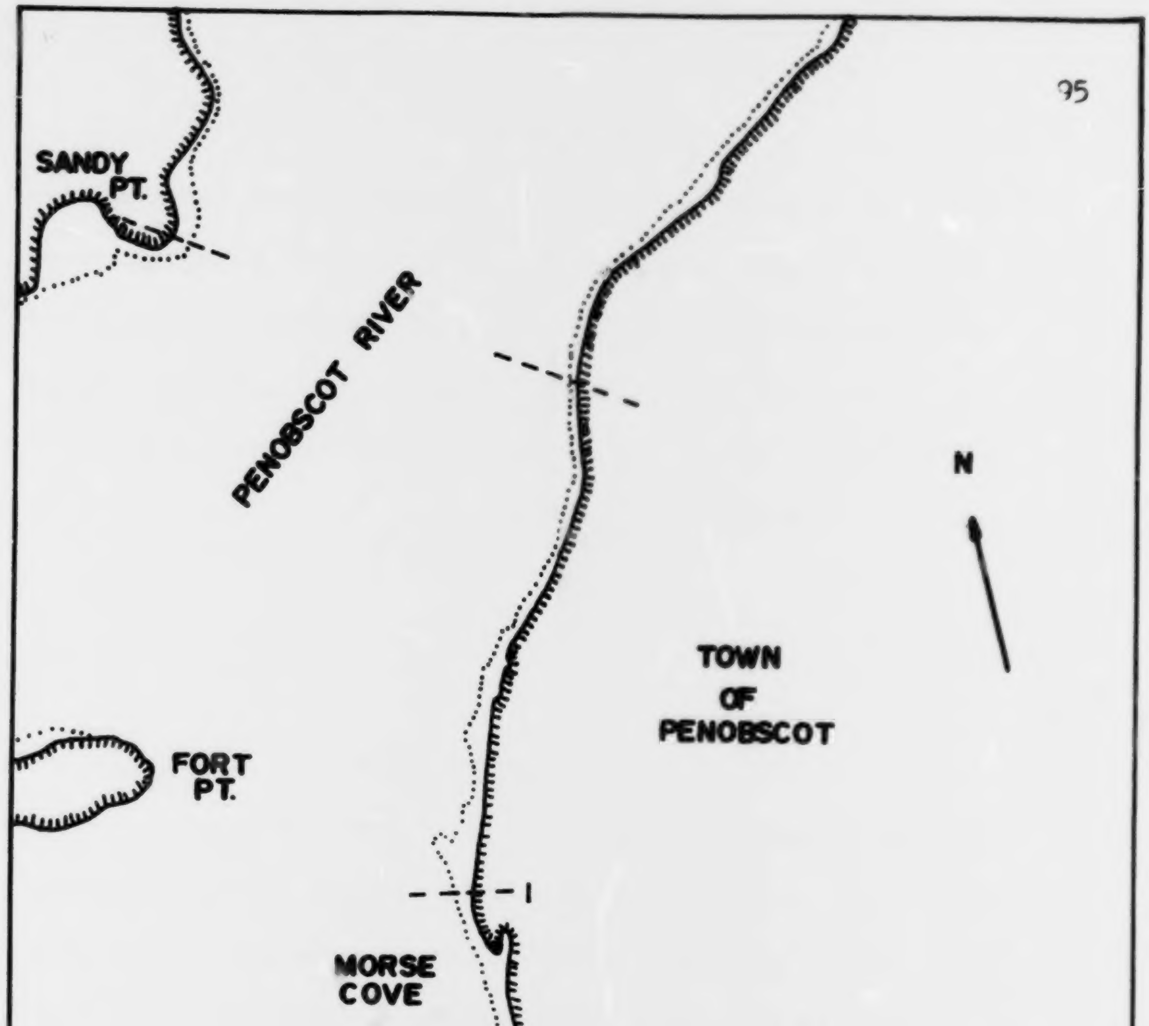

SANDY PT.
PENOBSCOT RIVER
N
TOWN OF PENOBSCOT
FORT PT.
1
MORSE COVE
35
50
43
TOWN LINE
.... MEAN LOW WATER
NAUTICAL MILES
0
1/2
TOWN OF CASTINE
SHELLFISH GROWING AREA
TOWN OF PENOBSCOT

FIGURE 28

Allowances made due to the rocky features of the shoreline reduced this potential clam growing area to 27 acres. Twenty-three (23) shellfish samples were collected here and the total commercial population was estimated to be 800 bushels with a community value from $15,700 to $43,200.

## Morse Cove (Stations 36 - 43)

This portion of Morse Cove within the boundaries of Penobscot contains a very small intertidal zone totaling 8 acres. Of these 8 acres, one was deducted from the total because of the evenly distributed cobbles and stones along the upper intertidal zone leaving 7 acres of prospective clam growing flats. It was only necessary to collect 9 shellfish samples within this area because the clam populations were confined to the lower intertidal zone. Available commercial populations were estimated to be 600 bushels. Community value of this crop was estimated to be $12,100 to $32,400.

## Conclusion

Results of the soft-shell clam survey indicate that this portion of Penobscot is relatively poor in both clam producing areas and existing clam populations. From a total estimated standing crop of 1,400 bushels of harvestable soft-shell clams, the estimated value to the community was $27,800 to $75,600.

Projected yields during the second year of harvest were also estimated to be poor. Benefits applied to the Town of Penobscot from this estimated standing crop of clams would be from $13,000 to $48,600.

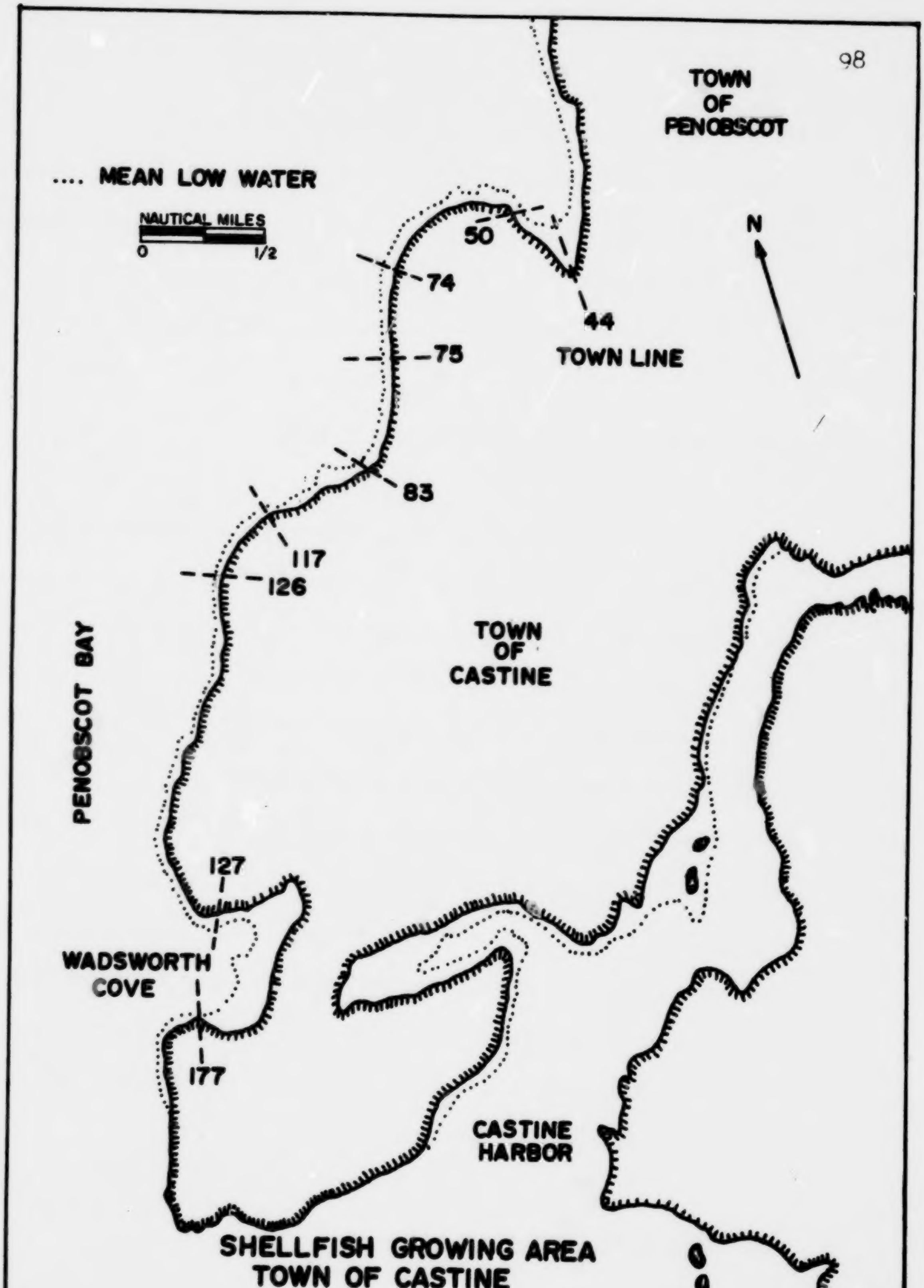
Town of Castine

## Morse Cove (Stations 44 - 50)

This portion of Morse Cove was considered a mirror image of the half located in the Town of Penobscot. Consequently, the same estimates for standing crop and value are used.

## Castine, West Shore (Stations 51 - 74)

This shoreline of Castine is typified by a narrow band of intertidal zone containing rock outcrops and scattered "cobble sized" stones. See Figure 29. Mechanically made estimates of the existing intertidal zone derived from nautical charts totaled 28 acres. This figure was reduced


TOWN OF PENOBSCOT
.... MEAN LOW WATER
NAUTICAL MILES
0
1/2
N
50
74
44
TOWN LINE
75
83
117
126
TOWN OF CASTINE
PENOBSCOT BAY
127
WADSWORTH COVE
177
CASTINE HARBOR

SHELLFISH GROWING AREA
TOWN OF CASTINE

FIGURE 29

to 24 acres of possible clam producing flats after deductions were made to account for rocky areas. Thirty-five (35) shellfish samples from these growing areas were collected, which indicated a possible commercial population of 700 bushels with a value to the community of $12,600 to $37,800.

### Castine, West Shore (Stations 75 - 126)

This section of shoreline in the Town of Castine is a continuation of the type encountered in the area covered by Stations 51 - 74. The intertidal zone, again, is a narrow band paralleling the shoreline. There were no apparent modifications noticed along this stretch of beach to distinguish it from any other covered in the immediate area. Calculations made from nautical charts by planimeter showed the intertidal zone to contain 35 acres. Deductions made for the rocky condition of the beach reduced the potential clam growing area to 30 acres. Sixty samples were collected in the area on the 11th of August, which indicated a commercial population of 2,200 bushels with a community value from $42,600 to $118,800. See Table 5.

### Wadsworth Cove (Stations 127 - 177)

### H. Pahren

85 This cove was the last to be surveyed on the mainland. The resource survey was restricted to the cove proper since conditions of the outer fringes, evidenced by high densities of cobble-sized stones, appeared unsuitable for clam production. Carpets of smaller stones also covered the upper portion of the intertidal zone throughout many sections of the beach.

Planimeter readings made from nautical charts showed an intertidal zone of 56 acres. This total acreage was reduced to 50 when adjustments were made to account for the rocky patches throughout the clam growing areas. This study was conducted on the 11th of August, and the results obtained from soft-shell clam samples of 62 stations indicated a potential commercial population of 4,200 bushels with a community value from $82,600 to $226,800.

## Conclusion

Of all the areas surveyed in the Town of Castine, it is apparent that Wadsworth Cove is the most productive and would aid more in boosting the economy of the community than all the other surveyed areas of the town combined.

Estimated results on a town basis show that the present standing crop of marketable soft-shell clams is 7,700 bushels with a community value of from $149,900 to $415,800.

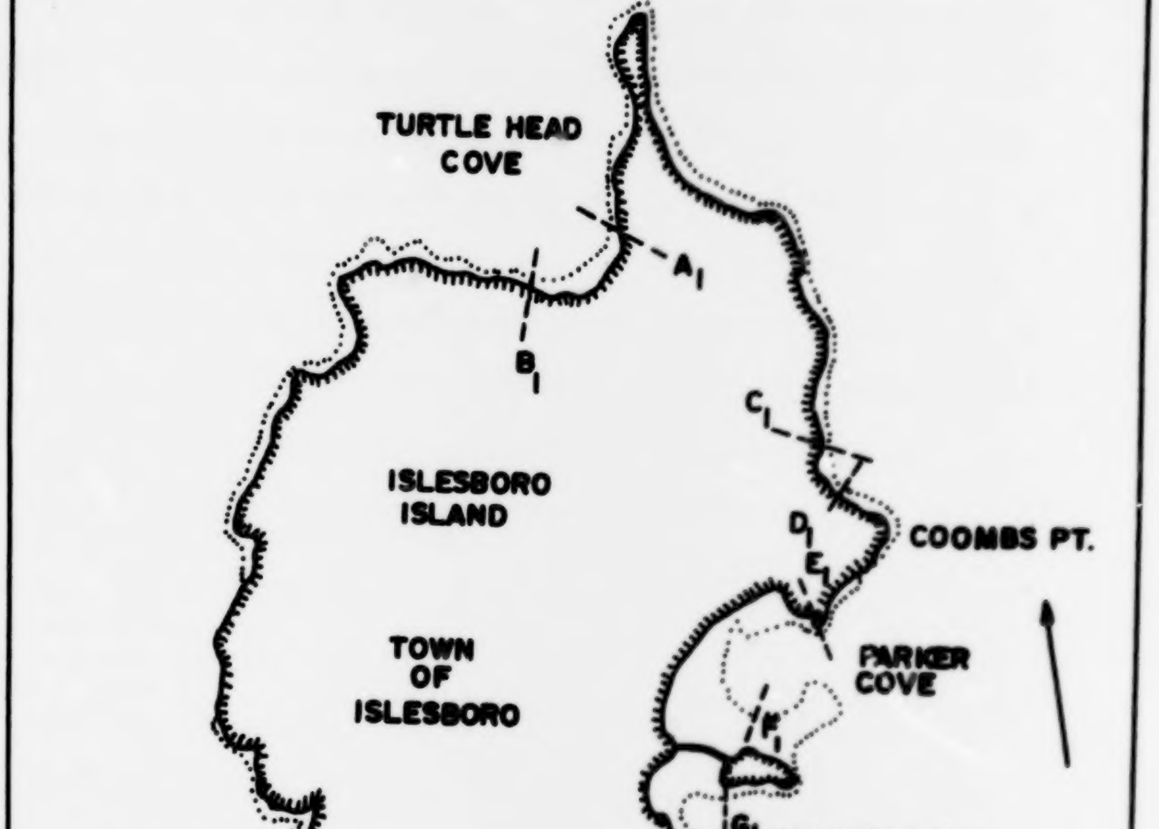
Projection of these estimates into a second year indicate a standing crop of commercial size clams to be 4,700 bushels with a potential community value from $90,800 to $253,800.

## Town of Islesboro

### Turtle Head Cove ($A_1$ - $B_1$)

Only the inner portion of this cove was subjected to a shellfish resource survey. The area covered was rather limited in scope and uniform in condition, making it unnecessary for an adjustment of acreage. The clam producing intertidal zone totaled 15 acres. The collection of 22 clam samples showed the potential standing crop of commercial sized clams to be 1,100 bushels with a value to the community from $22,100 to $59,400. See Figure 30 and Table 5.

### Coombs Point ($C_1$ - $D_1$)


TURTLE HEAD
COVE
$A_1$
$B_1$
$C_1$
ISLESBORO
ISLAND
$D_1$
$E_1$
COOMBS PT.
TOWN
OF
ISLESBORO
PARKER
COVE
$F_1$
$G_1$
COOMBS COVE
$H_1$
.... MEAN LOW WATER
NAUTICAL MILES
0
1/2

SHELLFISH GROWING AREA
TOWN OF ISLESBORO

FIGURE 30

H. Pahren

The area of Coombs Point surveyed for clam resources was very small. The amount of growing area available in this plot was 5 acres, and, since the flat was uniform in nature and lacked any rocky feature, it was unnecessary to make any adjustment. The total area surveyed remained at 5 acres. Because this flat was of such a uniform condition and the shellfish were dispersed in an equally uniform manner, it was only necessary to collect 3 shellfish samples to arrive at a commercial standing crop of 1,600 bushels. The potential community value from this area is $30,500 to $86,400.

## Parker Cove ($E_1$ - $F_1$)

This cove is located on the east side of Islesboro Island and is separated from an adjoining cove by a small island connected to the main island by a narrow bar. The entire cove was not surveyed for shellfish due to time limitations and the general lack of shellfish on the flats northeast of the small island.

The intertidal zone of Parker Cove investigated during this survey consisted of 85 acres. Adjustments were necessary to this total because of the presence of large patches of eel grass and mussels. The actual number of acres available for clam production amounted to 73. Sixteen shellfish samples were collected over rather large intervals. The resulting estimated standing crop was 3,400 bushels of commercial size clams with a value to the community from $65,300 to $183,600.

## Coombs Cove ($G_1$ - $H_1$)

This cove is located just south of Parker Cove on the east side of Islesboro Island and contains a great deal less available clam flats than its northern neighbor. Estimates of land area by planimeter show an intertidal zone of approximately 36 acres. No adjustments were deemed necessary in this area to account for the small amounts of mussels and eel grass. Thirty-two (32) shellfish samples were collected from this cove on the 9th of August, and the resulting estimate indicated the potential standing crop of commercial size soft-shell clams to be a poor 700 bushels with a community value of $12,600 to $37,800.

## Conclusion

The only cove in the surveyed portion of the Islesboro Island showing reasonable clam production is Parker

Cove. The remaining areas seem to possess a fluctuating type of production which appeared to be at a low point during this particular period.

The present standing crop of commercial sized clams for the town is 6,800 bushels with a community value of from $130,500 to $367,200. The estimated marketable crop of clams for the following year would be 5,500 bushels with a community value of from $106,000 to $297,000.

## Resources of Upper Penobscot Bay

About 90 percent of the shore surrounding Penobscot Bay was surveyed for soft-shell clam resources. The areas not surveyed were either industrial complexes or estimated very low producing areas. The coves proved to be the most productive areas for clam growth. The remaining shoreline contained clam populations interspersed with scattered boulders and rock outcrops.

The most productive clam areas were Stockton Springs and Searsport, followed by Northport and Belfast. The remaining Towns of Penobscot, Castine, and Islesboro were not completely surveyed, which accounts partially for their low total figures. A summary of the standing crop and community value is shown in Table 6.

## TABLE 6

## PRESENT AND PROJECTED STANDING CROPS AND THEIR VALUES FOR TOWNS SURROUNDING PENOBSCOT BAY, MAINE

| | 1966 | | 1967 | |
|---|---|---|---|---|
| | Standing Crop | | Standing Crop | |
| Town | Bushels | Community Value Range | Bushels | Community Value Range |
| Northport | 17,400 | $338,700-$ 939,600 | 8,400 | $164,000-$453,600 |
| Belfast | 16,100 | $311,300-$ 869,400 | 9,400 | $183,000-$507,600 |
| Searsport | 20,800 | $402,400-$1,123,200 | 6,200 | $120,000-$334,800 |
| Stockton Springs | 26,400 | $515,400-$1,425,600 | 11,100 | $215,000-$599,400 |
| Penobscot | 1,400 | $ 27,800-$ 75,600 | 900 | $ 18,000-$ 48,600 |
| Castine | 7,700 | $149,900-$ 415,800 | 4,700 | $ 90,800-$253,800 |
| Islesboro | 6,800 | $130,500-$ 367,200 | 5,500 | $106,000-$297,000 |
| Total Penobscot Bay Area | 96,600 | $1,876,000-$5,216,400 | 46,200 | $896,800-$2,494,800 |

H. Pahren

For the total area of Penobscot Bay affected by the recent shellfish area closures, the estimated population was placed at 96,600 bushels of marketable soft clams, valued from a community standpoint at $1,876,000 to $5,216,400. Potential harvest during a second season was estimated to be 46,200 bushels. These would have a market value to the community of from $896,800 to $2,494,800.

## Marketing of Clams

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On July 1, 1966, the effective date of the total closure of Searsport and Stockton Springs for harvesting clams and other marine mollusks, there were 53 licensed diggers in the two towns. About 32 were full-time diggers; the rest dug clams occasionally.

The Town of Searsport allows non-residents to take up a peck a day from their flats. A varied number of people from nearby towns and cities dig for fun on weekends and holidays. This past year (1966), during the Memorial Day weekend, the local Sea and Shore Fisheries warden counted 500 sport diggers in Long Cove and along the western shore of Sears Island. Each digger could legally take a peck of clams. Better than 100 diggers are usually found on these flats on weekends and holidays from May through October.

### H. Pahren

Many of the clams harvested in the Stockton Springs area have been purchased by Mr. Ralph Hall, a local interstate dealer. In 1965 Mr. Hall shipped about half of his clams to the Maine Shellfish Company, which, in turn, was engaged in both interstate and intrastate shipments.

## EFFECTS OF POLLUTION ON WATER QUALITY

### GENERAL

Water quality of the Penobscot River has been studied by the Maine Water Improvement Commission, and the waters over shellfish beds have been studied by the Maine Department of Sea and Shore Fisheries for many years.

In an excellent staff report published in 1963, the Maine Water Improvement Commission (5) found in the tidal area from Bangor to Bucksport that the river was either in Class D or in nuisance condition. Table A-1 in the Appendix presents the classification system existing at the time. Table A-2 lists similar information for tidal waters.

Based on samples showing high coliform values taken by the Maine Department of Sea and Shore Fisheries, Mr. Ronald W. Green, Commissioner of Sea and Shore Fisheries, closed the remaining shellfish beds open to digging in

Searsport and Stockton Springs. That closure, along with the beds already closed due to pollution, meant that all the shellfish beds were closed from Great Spruce Head in Northport to Belfast, Searsport, Stockton Springs, the entire Penobscot River area, and nearly all of Castine. The only shellfish beds open in the study area are located at Islesboro Island.

## BACTERIA

Water polluted by wastes from warm-blooded animals, such as humans and chickens, frequently contains pathogenic bacteria. These pathogens, directly, or indirectly by eating raw or partially cooked shellfish, can cause gastrointestinal diseases such as typhoid fever, dysentery, and diarrhea. The infectious hepatitis virus, and other viruses, may also be present. Body contact with water polluted by bacteria can also cause eye, ear, nose, throat or skin infections. Therefore, bacterial pollution of waters presents a health hazard not only to those who come in contact with it, but also to those who may eat shellfish taken from the waters.

Sewage and some industrial wastes also contain bacteria of the coliform group, which typically occur in excreta or feces of warm-blooded animals and are readily detectable. Although most are harmless in themselves, coliform bacteria are always present in waters polluted by warm-blooded animals' wastes and are considered indicators of the probable presence of pathogenic bacteria. The State of Maine evaluates water quality on the basis of sanitary survey findings and total coliform content. Recently, refined methods for isolation and detection of Salmonella organisms have made it practical to test for these specific infectious disease bacteria.

The coliform group usually is designated as total coliforms and most bacterial standards are set using coliform limits. Included in the total coliform bacteria test are fecal coliforms. A separate test can be performed on a water sample to determine the number of fecal coliforms present. Since fecal coliforms can only come from warm-blooded animals, they are considered proof of fecal pollution. The results of coliform determinations are expressed in terms of most probable numbers per 100 milliliters (MPN/100 ml). One hundred milliliters is approximately one-half cup.

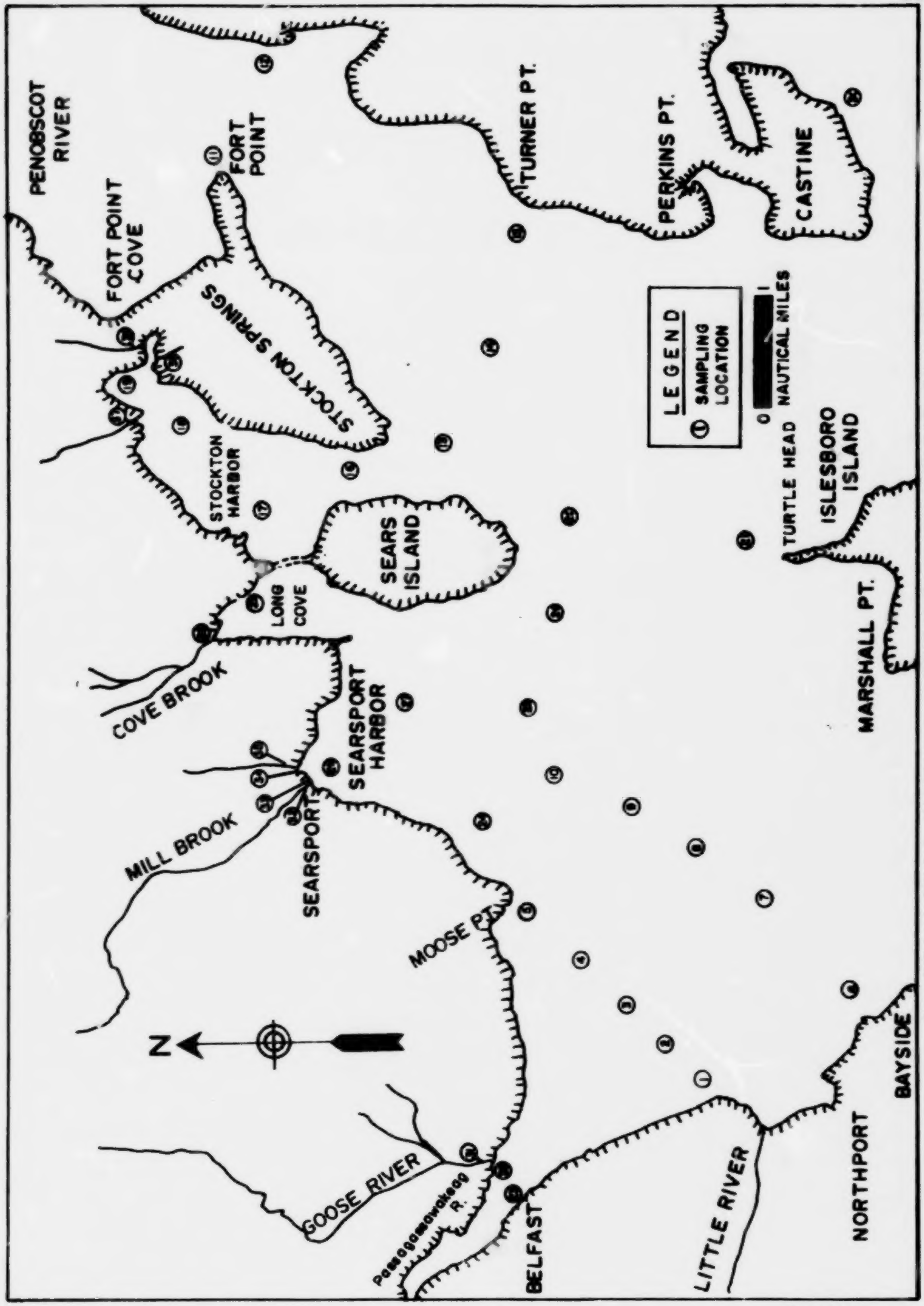
For harvesting shellfish, the Maine Department of Sea and Shore Fisheries requires that the median coliform value for the water may not exceed 70 MPN/100 ml and not more than 10 percent of the values may exceed 230 MPN/100 ml.

A bacteriological study was made by the Merrimack River Project in the upper Penobscot Bay area during the period from July 27, 1966, to August 16, 1966. The sampling locations are shown on Figure 31, and the latitude and longitude of these stations can be found in Table A-3 in the Appendix. A statistical summary of all samples collected is shown on Table 7. Conditions are also summarized for the different stages of the tidal cycle in Tables 8, 9 and 10 and these data are shown on a map of the area in Figures 32, 33 and 34.

Tables A-4, A-5 and A-6 in the Appendix summarize the chloride and salinity data for high, ebb and low tide, respectively. Salinity was calculated from the chloride value. An average sea water salinity is about 35 parts per thousand or about 19 parts per thousand chloride. These data show that over 75 percent of the water at every sampling station except near the poultry plant effluent was sea water. The average chloride value was approximately the same at high, ebb or low tide.

Table A-7 in the Appendix summarizes all the surface temperatures associated with the bacteriological sampling.

The highest densities of coliform organisms in Penobscot Bay were found near Fort Point and east of Sears Island. At low tide the total coliforms averaged approximately 5,000 MPN/100 ml near Fort Point. Values decreased toward the western part of the bay and then increased again at the Passagassawakeag River. It is apparent that untreated


PENOBSCOT RIVER
FORT POINT COVE
FORT POINT
TURNER PT.
PERKINS PT.
CASTINE
STOCKTON SPRINGS
STOCKTON HARBOR
SEARS ISLAND
LONG COVE
COVE BROOK
SEARSPORT HARBOR
SEARSPORT
MILL BROOK
MOOSE PT.
GOOSE RIVER
Passagassawakeag R.
BELFAST
LITTLE RIVER
NORTHPORT
BAYSIDE
MARSHALL PT.
TURTLE HEAD
ISLESBORO ISLAND
LEGEND
SAMPLING LOCATION
0
1
NAUTICAL MILES
N

BACTERIALOGICAL SAMPLING LOCATIONS IN PENOBSCOT BAY AREA

**FIGURE 31**

# TABLE 7

## COLIFORM BACTERIA IN PENOBSCOT BAY AREA
7/27/1966 - 8/16 1966

| SAMPLE STATION | TOTAL COLIFORM BACTERIA MPN/100 ML | | | | FECAL COLIFORM BACTERIA MPN/100 ML | | | | NO. OF SAMPLES |
|---|---|---|---|---|---|---|---|---|---|
| | MAXIMUM | AVERAGE* | MEDIAN | MINIMUM | MAXIMUM | AVERAGE * | MEDIAN | MINIMUM | |
| 1 | 1,500 | 387 | 230 | 36 | 750 | 128 | 36 | 36 | 18 |
| 2 | 930 | 317 | 91 | <36 | 430 | 85 | <36 | 30 | 18 |
| 3 | 2,400 | 453 | 230 | 36 | 230 | 56 | 36 | <36 | 18 |
| 4 | 2,400 | 448 | 230 | 36 | 230 | 56 | <36 | <36 | 18 |
| 5 | 930 | 371 | 230 | 36 | 91 | 42 | <36 | <36 | 18 |
| 6 | 2,400 | 280 | 91 | <36 | 930 | 103 | 36 | <36 | 15 |
| 7 | 2,400 | 390 | 91 | 36 | 73 | 36 | <36 | <36 | 15 |
| 8 | 4,600 | 675 | 230 | 91 | 230 | 56 | <36 | <36 | 15 |
| 9 | 2,400 | 615 | 430 | <36 | 230 | 66 | 36 | <36 | 15 |
| 10 | 4,600 | 975 | 930 | <36 | 91 | 45 | <36 | 30 | 15 |
| 11 | 24,000 | 4,969 | 2,400 | 430 | 430 | 174 | 100 | <36 | 18 |
| 12 | ≥24,000 | 5,960 | 2,250 | 290 | 430 | 168 | 91 | 36 | 18 |
| 13 | 11,000 | 2,149 | 930 | 73 | 430 | 81 | 36 | <36 | 18 |
| 14 | ≥24,000 | 5,030 | 3,500 | 150 | 750 | 181 | 145 | <36 | 18 |
| 15 | 11,000 | 2,252 | 930 | 230 | 230 | 76 | 36 | 30 | 18 |
| 16 | 4,600 | 766 | 430 | 30 | 150 | 45 | <36 | <36 | 18 |
| 17 | 4,600 | 708 | 330 | <36 | 150 | 52 | <36 | <36 | 18 |
| 18 | 2,400 | 326 | 91 | <36 | 91 | 39 | 36 | <36 | 18 |
| 19 | 150 | 74 | 36 | <36 | 36 | 36 | <36 | <36 | 6 |
| 20 | 4,600 | 2,012 | 1,950 | 430 | 150 | 54 | 36 | 30 | 18 |

## TABLE 7 (Continued)

| SAMPLE STATION | TOTAL COLIFORM BACTERIA MPN/100 ML | | | | FECAL COLIFORM BACTERIA MPN/100 ML | | | | NO. OF SAMPLES |
|---|---|---|---|---|---|---|---|---|---|
| | MAXIMUM | AVERAGE* | MEDIAN | MINIMUM | MAXIMUM | AVERAGE * | MEDIAN | MINIMUM | |
| 21 | 4,600 | 1,190 | 430 | <36 | 150 | 55 | 36 | <36 | 15 |
| 22 | ≥24,000 | 3,209 | 930 | 36 | 4,600 | 737 | 330 | <36 | 19 |
| 23 | 4,600,000 | 521,000 | 240,000 | 15,000 | 4,600,000 | 468,500 | 190,000 | 4,300 | 18 |
| 24 | 930 | 153 | 73 | 36 | 36 | 36 | <36 | <36 | 18 |
| 25 | 2,400 | 407 | 230 | <36 | 91 | 41 | <36 | <36 | 17 |
| 26 | 4,600 | 1,472 | 1,125 | 230 | 430 | 99 | 36 | <36 | 18 |
| 27 | 930 | 202 | 91 | <36 | 91 | 39 | <36 | <36 | 18 |
| 28 | 430 | 118 | 73 | 30 | 36 | 36 | <36 | 30 | 18 |
| 29 | 4,300 | 483 | 36 | 30 | 91 | 36 | <36 | <36 | 18 |
| 30 | 2,400 | 376 | 160 | <36 | 91 | 41 | <36 | <36 | 10 |
| 31 | -- | 24,000 | -- | -- | -- | 360 | -- | -- | 1 |
| 32 | 110,000 | 65,250 | 68,000 | 15,000 | 24,000 | 9,357 | 6,350 | 730 | 4 |
| 33 | -- | 24,000,000 | -- | -- | -- | 15,000,000 | -- | -- | 1 |
| 34 | -- | 24,000,000 | -- | -- | -- | 2,300,000 | -- | -- | 1 |
| 35 | 46,000,000 | ≥ 24,870,000 | ≥24,000,000 | 4,600,000 | 24,000,000 | 10,300,000 | 4,600,000 | 2,400,000 | 3 |
| 36 | 240,000 | 73,840 | 27,600 | 91 | 11,000 | 5,174 | 2,800 | <36 | 4 |
| 37 | 15,000 | 7,825 | 6,950 | 2,400 | 4,300 | 1,940 | 1,650 | 150 | 4 |
| 38 | ≥ 240,000 | ≥ 77,538 | ≥ 132,000 | 150 | 9,300 | 4,018 | 5,850 | 73 | 4 |
| 39 | -- | 150 | -- | -- | -- | 91 | -- | -- | 1 |

* A value of 36 was used to calculate averages for <36 values.

## TABLE 8

## COLIFORM BACTERIA IN PENOBSCOT BAY AREA
HIGH TIDE
7/27/66 - 8/16/66

| | TOTAL COLIFORM BACTERIA-MPN/100 ml | | | | FECAL COLIFORM BACTERIA-MPN/100 ml | | | |
|---|---|---|---|---|---|---|---|---|
| STATION | MAXIMUM | AVERAGE* | MEDIAN | MINIMUM | MAXIMUM | AVERAGE* | MEDIAN | MINIMUM |
| 1 | 1,500 | 383 | 120 | 36 | 750 | 187 | 36 | <36 |
| 2 | 930 | 255 | 120 | 36 | 230 | 67 | < 36 | 30 |
| 3 | 2,400 | 575 | 190 | 91 | 36 | 36 | < 36 | <36 |
| 4 | 2,400 | 536 | 230 | 36 | 230 | 68 | < 36 | <36 |
| 5 | 930 | 517 | 540 | 73 | 36 | 36 | 36 | <36 |
| 6 | 2,400 | 570 | 91 | 36 | 930 | 215 | < 36 | <36 |
| 7 | 2,400 | 562 | 91 | 36 | 36 | 36 | 36 | <36 |
| 8 | 4,600 | 1,256 | 430 | 91 | 230 | 86 | 36 | <36 |
| 9 | 930 | 353 | 230 | 36 | 36 | 36 | < 36 | <36 |
| 10 | 1.500 | 788 | 930 | 150 | 91 | 54 | 36 | <36 |
| 11 | 24,000 | 5.032 | 1.215 | 430 | 390 | 137 | 64 | <36 |
| 12 | 4,600 | 1,832 | 1.215 | 930 | 430 | 139 | 91 | 36 |
| 13 | 11,000 | 3.103 | 930 | 230 | 91 | 54 | 36 | <36 |
| 14 | 11,000 | 3,543 | 2,400 | 430 | 230 | 68 | 36 | <36 |

TABLE 8 (Continued)

| STATION | TOTAL COLIFORM BACTERIA-MPN/100 ml |  |  |  | FECAL COLIFORM BACTERIA-MPN/100 ml |  |  |  |
|---|---|---|---|---|---|---|---|---|
|  | MAXIMUM | AVERAGE* | MEDIAN | MINIMUM | MAXIMUM | AVERAGE* | MEDIAN | MINIMUM |
| 15 | 950 | 730 | 930 | 230 | 36 | 36 | 36 | <36 |
| 16 | 1,500 | 518 | 430 | 91 | 150 | 64 | 36 | <36 |
| 17 | 2,400 | 659 | 430 | 36 | 150 | 55 | <36 | <36 |
| 18 | 2,400 | 709 | 330 | 36 | 36 | 36 | 36 | <36 |
| 19 | 150 | 74 | 36 | <36 | 36 | 36 | <36 | <36 |
| 20 | 2,400 | 1,582 | 1,665 | 430 | 36 | 36 | <36 | 30 |
| 21 | 2,400 | 805 | 430 | 36 | 150 | 59 | 36 | <36 |
| 22 | 11,000 | 2,208 | 430 | 230 | 930 | 325 | 230 | <36 |
| 23 | 430,000 | 217,670 | 240,000 | 46,000 | 5 240,000 | 143,050 | 161,500 | 9,300 |
| 24 | 930 | 230 | 73 | 36 | 36 | 36 | <36 | <36 |
| 25 | 930 | 364 | 390 | 36 | 91 | 47 | 36 | <36 |
| 26 | 4,600 | 1,682 | 1,315 | 230 | 430 | 111 | 36 | <36 |
| 27 | 430 | 166 | 142 | <36 | 36 | 36 | <36 | <36 |
| 28 | 230 | 86 | 73 | 30 | 36 | 36 | 36 | 30 |
| 29 | 930 | 236 | 91 | <36 | 91 | 36 | <36 | <36 |
| 30 | 2,400 | 953 | 1,315 | 230 | 36 | 36 | <36 | <36 |

* A value of 36 was used to calculate averages for <36 values.

## TABLE 9

### COLIFORM BACTERIA IN PENOBSCOT BAY AREA
EBB TIDE
7/27/66 - 8/16/66

| STATION | TOTAL COLIFORM BACTERIA-MPN/100 ml<br>MAXIMUM | AVERAGE* | MEDIAN | MINIMUM | FECAL COLIFORM BACTERIA-MPN/100 ml<br>MAXIMUM | AVERAGE * | MEDIAN | MINIMUM |
|---|---|---|---|---|---|---|---|---|
| 1 | 930 | 377 | 330 | 91 | 230 | 78 | 36 | < 36 |
| 2 | 930 | 278 | 91 | 36 | 430 | 102 | 36 | < 36 |
| 3 | 1,500 | 406 | 190 | 36 | 230 | 68 | 36 | < 36 |
| 4 | 930 | 382 | 430 | 36 | 91 | 45 | 36 | < 36 |
| 5 | 930 | 371 | 340 | 36 | 91 | 54 | <36 | < 36 |
| 6 | 91 | 69 | 91 | <36 | 36 | 36 | <36 | < 36 |
| 7 | 1,500 | 433 | 150 | 36 | 73 | 43 | <36 | < 36 |
| 8 | 230 | 150 | 110 | 91 | 91 | 47 | <36 | < 36 |
| 9 | 2,400 | 788 | 430 | 91 | 230 | 75 | 36 | < 36 |
| 10 | 2,400 | 916 | 930 | 91 | 91 | 47 | < 36 | < 36 |
| 11 | 11,000 | 4,688 | 4,600 | 930 | 430 | 168 | 120 | 36 |
| 12 | ≥ 24,000 | 11,100 | 7,800 | 1,500 | 430 | 212 | 190 | 36 |
| 13 | 2,400 | 1,110 | 680 | 73 | 91 | 54 | 36 | < 36 |
| 14 | ≥ 24,000 | 6,982 | 2,765 | 430 | 750 | 272 | 190 | < 36 |

TABLE 9 (Continued)

| STATION | TOTAL COLIFORM BACTERIA-MPN/100 ml<br>MAXIMUM | AVERAGE* | MEDIAN | MINIMUM | FECAL COLIFORM BACTERIA-MPN/100 ml<br>MAXIMUM | AVERAGE* | MEDIAN | MINIMUM |
|---|---|---|---|---|---|---|---|---|
| 15 | 4,600 | 2,398 | 1,665 | 930 | 230 | 107 | 64 | <36 |
| 16 | 4,600 | 1,075 | 330 | 30 | 36 | 36 | 36 | <36 |
| 17 | 930 | 567 | 680 | 91 | 91 | 54 | 36 | <36 |
| 18 | 110 | 67 | 64 | < 36 | 36 | 36 | < 36 | <36 |
| 19 | -- | -- | -- | -- | -- | -- | -- | -- |
| 20 | 4,600 | 1,715 | 1,215 | 430 | 36 | 36 | 36 | < 36 |
| 21 | 2,400 | 891 | 430 | < 36 | 91 | 58 | < 36 | <36 |
| 22 | ≥ 24,000 | 4,848 | 1,665 | 430 | 4,600 | 1,238 | 680 | 110 |
| 23 | 930,000 | 284,000 | 240,000 | 15,000 | 930,000 | 256,700 | 157,500 | 9,300 |
| 24 | 230 | 87 | 64 | 36 | < 36 | 36 | <36 | <36 |
| 25 | 430 | 260 | 230 | 210 | 36 | 36 | < 36 | <36 |
| 26 | 2,400 | 1,140 | 590 | 430 | 430 | 53 | 64 | <36 |
| 27 | 930 | 232 | 91 | < 36 | 36 | 36 | < 36 | <36 |
| 28 | 430 | 177 | 64 | <36 | 36 | 36 | <36 | <36 |
| 29 | 2,400 | 448 | 36 | <36 | < 36 | 36 | <36 | <36 |
| 30 | 430 | 250 | 230 | 91 | 91 | 54 | 36 | <36 |

* A value of 36 was used to calculate averages for <36 values.

## TABLE 10

## COLIFORM BACTERIA IN PENOBSCOT BAY AREA
LOW TIDE
7/27/66 - 8/17/66

| | TOTAL COLIFORM BACTERIA-MPN/100 ml | | | | FECAL COLIFORM BACTERIA-MPN/100 ml | | | |
|---|---|---|---|---|---|---|---|---|
| **STATION** | **MAXIMUM** | **AVERAGE*** | **MEDIAN** | **MINIMUM** | **MAXIMUM** | **AVERAGE*** | **MEDIAN** | **MINIMUM** |
| 1 | 930 | 400 | 330 | 150 | 430 | 120 | 64 | <36 |
| 2 | 930 | 418 | 260 | < 36 | 230 | 87 | 36 | <36 |
| 3 | 930 | 377 | 330 | 91 | 150 | 64 | 36 | <36 |
| 4 | 930 | 427 | 230 | 91 | 150 | 55 | < 36 | <36 |
| 5 | 430 | 226 | 230 | 36 | 36 | 36 | < 36 | <36 |
| 6 | 430 | 199 | 150 | 36 | 91 | 58 | 36 | 36 |
| 7 | 430 | 176 | 91 | 36 | 36 | 36 | < 36 | <36 |
| 8 | 2,400 | 616 | 210 | 91 | 36 | 36 | < 36 | <36 |
| 9 | 2,400 | 705 | 430 | < 36 | 230 | 86 | 36 | <36 |
| 10 | 4,600 | 1,217 | 430 | < 36 | 36 | 36 | < 36 | 30 |
| 11 | 11,000 | 5,188 | 3,350 | 930 | 430 | 217 | 130 | 91 |
| 12 | 11,000 | 4,953 | 3,500 | 290 | 430 | 152 | 91 | 36 |
| 13 | 4,600 | 2,232 | 1,665 | 430 | 430 | 134 | 36 | <36 |
| 14 | 11,000 | 4,558 | 4,600 | 150 | 430 | 203 | 190 | <36 |

## TABLE 10 (Continued)

| STATION | TOTAL COLIFORM BACTERIA-MPN/100 ml<br>MAXIMUM | AVERAGE* | MEDIAN | MINIMUM | FECAL COLIFORM BACTERIA-MPN/100 ml<br>MAXIMUM | AVERAGE* | MEDIAN | MINIMUM |
|---|---|---|---|---|---|---|---|---|
| 15 | 11,000 | 3,627 | 2,400 | 430 | 230 | 87 | 64 | 36 |
| 16 | 2,400 | 705 | 330 | 91 | 36 | 36 | <36 | <36 |
| 17 | 4,600 | 896 | 210 | <36 | 91 | 45 | <36 | <36 |
| 18 | 750 | 203 | 82 | 36 | 91 | 45 | 36 | <36 |
| 19 | -- | -- | -- | -- | -- | -- | -- | -- |
| 20 | 4,600 | 2,738 | 2,400 | 930 | 150 | 92 | 91 | 36 |
| 21 | 4,600 | 1,872 | 1,500 | 430 | 91 | 47 | 36 | <36 |
| 22 | 4,600 | 2,375 | 930 | 36 | 2,400 | 662 | 230 | <36 |
| 23 | 4,600,000 | 1,055,170 | 335,000 | 21,000 | 4,600,000 | 1,005,700 | 195,000 | 4,300 |
| 24 | 430 | 143 | 64 | 36 | 36 | 36 | 36 | <36 |
| 25 | 2,400 | 588 | 64 | <36 | 73 | 42 | <36 | <36 |
| 26 | 2,400 | 1,593 | 2,400 | 430 | 210 | 65 | 36 | <36 |
| 27 | 430 | 209 | 160 | <36 | 91 | 45 | 36 | <36 |
| 28 | 230 | 93 | 82 | <36 | 36 | 36 | <36 | <36 |
| 29 | 4,300 | 766 | 36 | <36 | 36 | 36 | <36 | <36 |
| 30 | 36 | 36 | 36 | <36 | <36 | 36 | <36 | <36 |

* A value of 36 was used to calculate averages for <36 values.

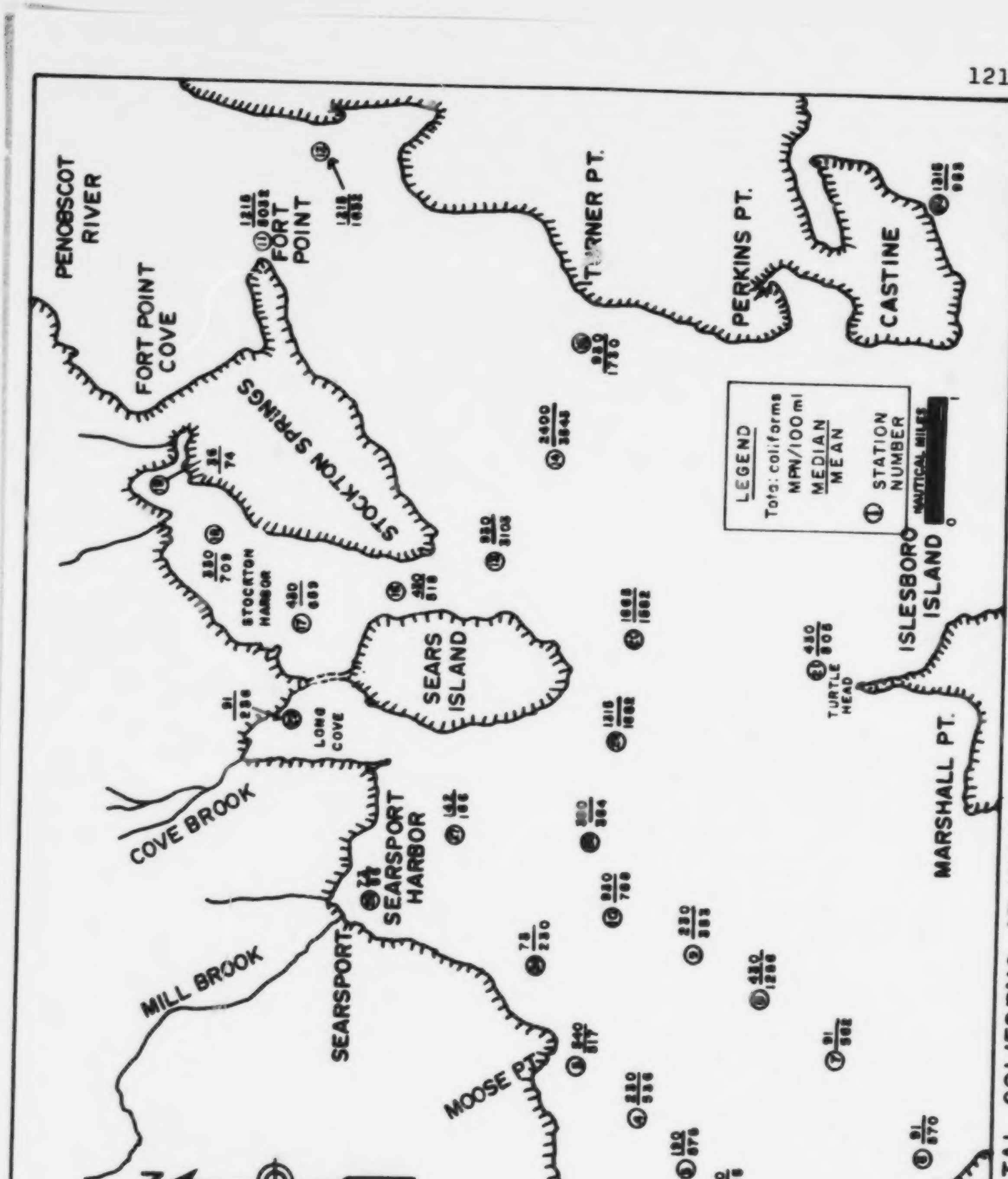

PENOBSCOT RIVER
FORT POINT COVE
FORT POINT
STOCKTON SPRINGS
STOCKTON HARBOR
TURNER PT.
PERKINS PT.
CASTINE
SEARS ISLAND
LONG COVE
COVE BROOK
SEARSPORT HARBOR
SEARSPORT
MILL BROOK
MOOSE PT.
GOOSE RIVER
PASSAGASSAWAKEAG R.
BELFAST
LITTLE RIVER
NORTHPORT
BAYSIDE
MARSHALL PT.
TURTLE HEAD
ISLESBORO ISLAND
LEGEND
Total coliforms MPN/100 ml
MEDIAN
MEAN
① STATION NUMBER
NAUTICAL MILES
0
1
N
240,000
217,670

FIGURE 32

TOTAL COLIFORMS AT HIGH TIDE IN PENOBSCOT BAY AREA

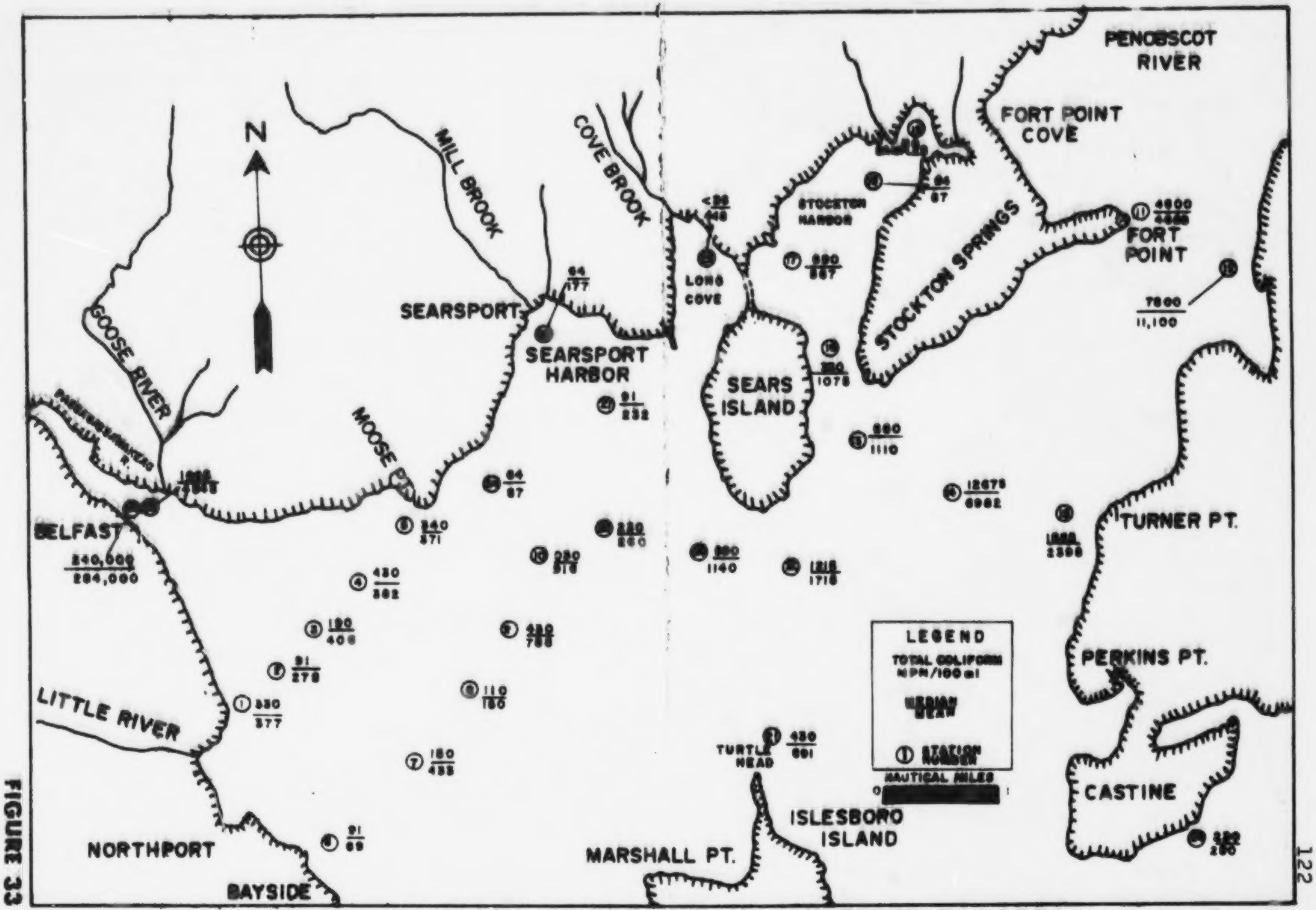
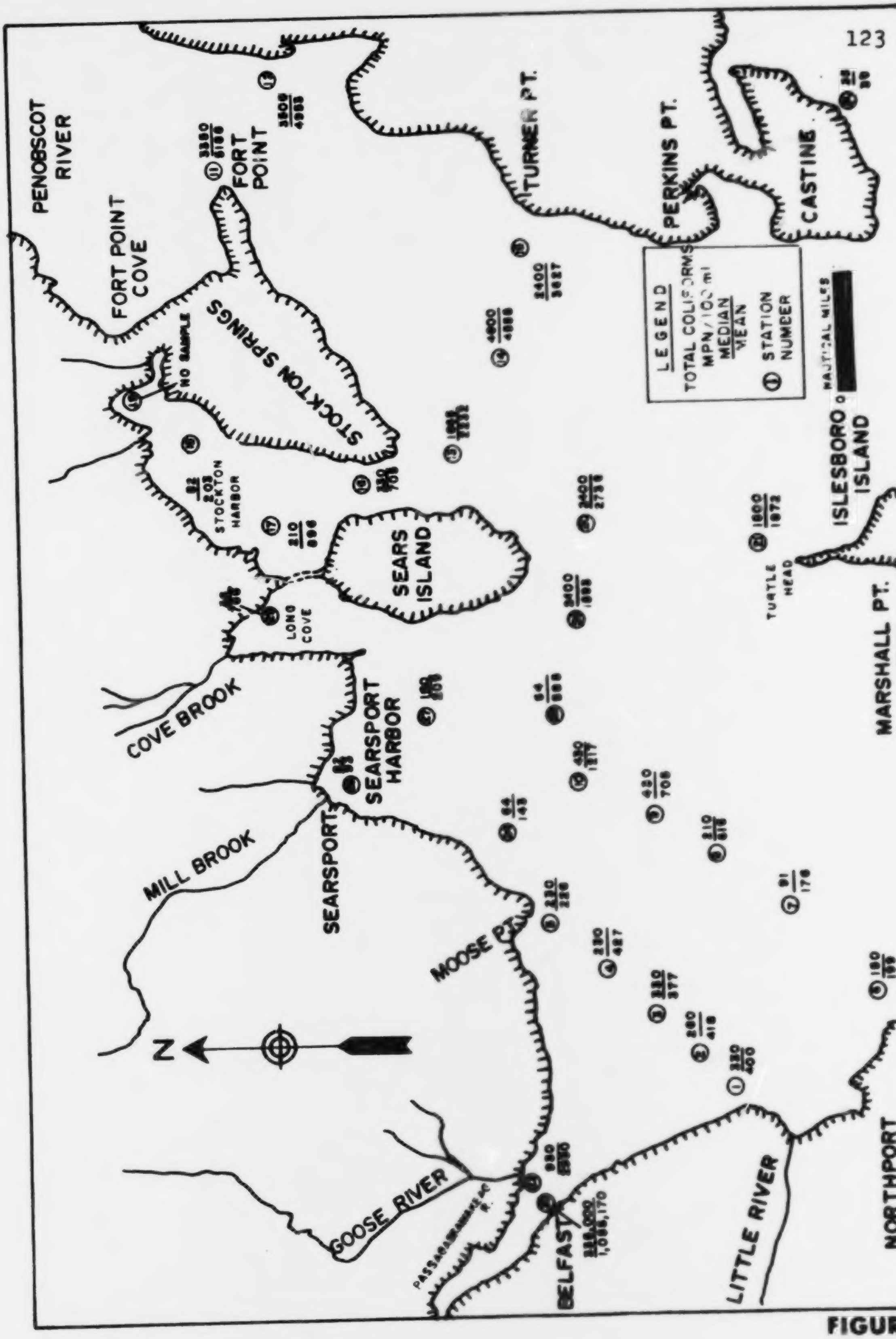

N
PENOBSCOT RIVER
FORT POINT COVE
FORT POINT
11 4900/4886
7800/11,100
STOCKTON SPRINGS
STOCKTON HARBOR
84/87
17 990/887
<20/448
LONG COVE
COVE BROOK
MILL BROOK
SEARSPORT
64/177
SEARSPORT HARBOR
GOOSE RIVER
BELFAST
240,000/284,000
MOOSE PT.
SEARS ISLAND
350/1078
880/1110
12678/6982
TURNER PT.
1880/2398
PERKINS PT.
CASTINE
320/290
LITTLE RIVER
NORTHPORT
BAYSIDE
MARSHALL PT.
TURTLE HEAD
ISLESBORO ISLAND
430/691
1 330/377
91/278
3 120/406
4 430/382
5 340/371
7 180/438
110/150
91/69
430/788
10 230/318
230/260
990/1140
1218/1718
84/87
21 91/232
LEGEND
TOTAL COLIFORM MPN/100 ml
MEDIAN
MEAN
1 STATION NUMBER
NAUTICAL MILES
0
1

FIGURE 33

TOTAL COLIFORMS AT EBB TIDE IN PENOBSCOT BAY AREA


PENOBSCOT RIVER
FORT POINT COVE
FORT POINT
TURNER PT.
PERKINS PT.
CASTINE
STOCKTON SPRINGS
STOCKTON HARBOR
NO SAMPLE
SEARS ISLAND
LONG COVE
COVE BROOK
SEARSPORT HARBOR
SEARSPORT
MILL BROOK
MOOSE PT.
GOOSE RIVER
PASSAGASSAWAKEAG R.
BELFAST
LITTLE RIVER
NORTHPORT
BAYSIDE
MARSHALL PT.
TURTLE HEAD
ISLESBORO ISLAND
N
LEGEND
TOTAL COLIFORMS MPN/100 ml
MEDIAN
MEAN
① STATION NUMBER
NAUTICAL MILES
0
1

TOTAL COLIFORMS AT LOW TIDE IN PENOBSCOT BAY AREA

**FIGURE 34**

discharges to the Penobscot River from Bangor; S. A. Maxfield Co., Bangor; Brewer; Standard Packaging Corp., Brewer; Hampden; Winterport; Frankfort; Bucksport; and St. Regis Paper Co., Bucksport, are the primary sources of high bacterial densities in the northeast section of Penobscot Bay.

The station near Turtle Head, an area still open for harvesting shellfish, had a median coliform level of 1,500/100 ml at low tide. At high tide the median coliform level decreased to 431/100 ml at this sampling location.

Near the entrance to Stockton Harbor (Stations 16 and 17) the bacteriological levels were substantially in excess of the maximum permitted for harvesting clams. Median values of 430 and 330/100 ml were found at these two stations, with maximum values being as high as 4,600/100 ml. In the inner harbor coliform densities decreased but the levels obtained at Station 18 still exceeded the standards. High tide values at Station 18 were over three times greater than found at low tide, indicating that water from Penobscot Bay containing high coliform densities was being pushed into the harbor on a flood tide. The two unnamed brooks flowing into the northeast end of Stockton Harbor (Station 37 and Station 38) showed evidence of sewage reaching the harbor from the Town of Stockton Springs.

In general, the water within Long Cove had a coliform density much lower than in the remainder of the study area. However, a maximum of 4,300 MPN/100 ml was obtained at low tide on one occasion. This high value could have resulted from local pollution. Cove Brook receives local sewage as the samples obtained from this point averaged nearly 20,000 MPN/100 ml.

Stations 27 and 28 in Searsport Harbor had relatively constant coliform levels at various tidal heights, and at both locations the levels exceeded the standards. There are several public and private sewers serving the Searsport area. Mill Brook (Station 32) receives wastes from about 30 homes and the average total coliform value was 65,250 MPN/100 ml. Stations 33, 34 and 35 are located in Searsport at sewer outfalls discharging into Searsport Harbor. Values of 24,000,000 MPN/100 ml total coliforms or greater were found at these sewer outfalls. Even fecal coliforms exceeded 2,000,000/100 ml in each sample obtained.

Belfast Bay Stations 1 through 3 had median coliform values greater at low tide than at high tide, indicating that the polluted waters from the Belfast area were reaching these stations during the outgoing tides. Station 4 had the same relative value at high tide as at low tide, while Station 5 near Moose Point had values greater at high tide than at low tide. Stations 6 and 7 had coliform values less than

Stations 1, 2, 3 or 8, indicating that there is not as much transfer of water in this area as at the other locations. The warmer temperatures in this area may be responsible for these lower values since the warmer water would tend to stay on top and not mix with other water.

The generally higher coliform values at Stations 5, 8, 9 and 10 indicate that these stations are probably influenced more by Penobscot River water since the values are usually higher than those more toward Northport. The major flow of the Penobscot River that comes to the west of Islesboro Island appears to be to the east of sampling stations 6 through 10 near low tide. As the tide changes, part of the Penobscot River water that is in the bay between Northport and Islesboro Island is pushed toward Searsport Harbor.

In the Castine area at high tide, the total coliforms were very high, as is shown by the median of 1,315 MPN/100 ml at Station 30. As the tide receded, the coliform values decreased. The high tide value was caused by the combination of bacteria from the Penobscot River and bacteria being discharged by the Town of Castine and the State of Maine's Maritime Academy. The station was upstream of most of the sewage being discharged directly to the bay waters in Castine Harbor.

The ratio of total coliforms to fecal coliforms is an indication of recent fecal pollution. The higher the ratio, the greater the time period since the wastes were discharged; and, conversely, the lower the ratio, the more recent the pollution. An analysis of Table 11 illustrates that local pollution has much greater effect than is indicated by the magnitude of the values at the various stations and shows a need for treatment of all sources of fecal pollution. Belfast Bay (Stations 1-10) and Searsport Harbor (Stations 27-28) have the smallest ratio of total coliforms to fecal coliforms, indicating that recent fecal pollution has taken place.

The two poultry processing plants, Maplewood Packing Co. and Penobscot Poultry Co., in Belfast, discharge an estimated bacterial load equivalent to a population of 4,000 persons each. The wastes have been reduced to some extent with better screening operations.

Bottom bacteria samples were collected at various stations and were found to be substantially lower in number most of the time, indicating that the warmer sewage wastes were nearer the surface.

On June 28, 1966, the Maine Sea and Shore Fisheries reported finding floating chicken entrails in Stockton Harbor at the northeast side of Sears Island. They reported that these entrails had a total coliform value greater than

# TABLE 11

## GEOMETRIC MEAN TOTAL COLIFORM VALUE FOR STATED FECAL COLIFORM VALUE

| FECAL COLIFORM PER 100 ML | GROUPS OF COLIFORM SAMPLING STATIONS | | | | |
|---|---|---|---|---|---|
| | 27-28 | 1-10 | 16-18 | 20,25,26 | 11-15 |
| < 36 | 64 | 100 | 140 | 380 | 520 |
| 36 | 100 | 180 | 300 | 700 | 750 |
| 91 | -- | 450 | -- | 1200 | 2300 |

170,000 MPN/100 ml. Again on July 8, 1966, floating chicken entrails were found by Fisheries personnel in Stockton Harbor at the same location. They also reported that on June 28, 1966, an animal fat film was found on the waters from the south tip of Sears Island to the north tip of Sears Island in Stockton Harbor. Large amounts of feathers have been reported found on Sears Island and Islesboro Island. A ferry running from Islesboro Island to Lincolnville, which is south of Northport, reported that their water intake screen had to be cleaned at least once a week in the past, due to chicken feathers clogging the screen. In the past, chicken entrails have been found all along the banks of Belfast Bay. During the period samples were being collected by the Merrimack River Project, there were no significant discharges of either feathers or entrails, indicating that either the new screening devices were working properly or that closer attention was given to maintenance of these screens.

Salmonellosis, the disease caused by various species of Salmonella bacteria, includes typhoid fever, gastroenteritis, and diarrhea. There are more than 900 known serological types of Salmonella. During 1964 there were over 21,000 Salmonella isolations from humans in the United States, and 57 known deaths resulted from Salmonellosis.(6)

Sterile gauze swabs were placed at Stations 1 through 5, 11 through 21, 23 through 25, 28, and 29, at the surface of the water for about 5 days. Tests were then carried out to determine if any Salmonella bacteria were present. Salmonellae were found at Stations 11, 12, 16 and 23 (poultry plant effluent). The United States Public Health Service's Communicable Disease Center determined the serotype. The results, listed in Table 12, clearly point out that poultry plant wastes are pathogenic to man since all Salmonella bacteria are pathogenic. Salmonella were isolated from both swabs placed in the Penobscot River.

When the swabs were in place at Station 16, the median fecal coliform value was less than 36 MPN/100 ml and the median total coliforms 430/100 ml. This indicates that Salmonella may be present even when coliform densities are not very high.

Clam samples were dug in Northport, Belfast, Searsport and Stockton Springs; the locations are shown on Figure 35. The bacteriological analyses of the clam meat were carried out by the Maine Department of Sea and Shore Fisheries and are presented in Table 13.

Some states use a maximum fecal coliform value of 230 MPN/100 grams clam meat as a standard to determine whether the meat is safe for human consumption. Stockton Harbor clam samples showed a wide variation in fecal coliform

## TABLE 12

## PENOBSCOT BAY AREA SALMONELLA RESULTS
## AUGUST, 1966

| STATION | DATE SWAB REMOVED | TOTAL COLIFORMS MPN/100 ml AVERAGE | TOTAL COLIFORMS MPN/100 ml MEDIAN | FECAL COLIFORMS MPN/100 ml AVERAGE* | FECAL COLIFORMS MPN/100 ml MEDIAN | SALMONELLAE |
|---|---|---|---|---|---|---|
| 1 | 8/2/66 | 387 | 230 | 128 | 36 | Not detected |
| 2 | 8/2/66 | 317 | 91 | 85 | <36 | Not detected |
| 3 | 8/2/66 | 453 | 230 | 56 | 36 | Not detected |
| 4 | 8/2/66 | 448 | 230 | 56 | < 36 | Not detected |
| 5 | 8/2/66 | 371 | 230 | 42 | < 36 | Not detected |
| 11 | 8/12/66 | 4,969 | 2,400 | 174 | 100 | S. thompson |
| 12 | 8/9/66 | 5,960 | 2,250 | 168 | 91 | S. heidelberg |
| 13 | 8/12/66 | 2,149 | 930 | 81 | 36 | Not detected |
| 14 | 8/9/66 | 5,030 | 3,500 | 181 | 145 | Not detected |
| 15 | 8/9/66 | 2,252 | 930 | 76 | 36 | Not detected |
| 16 | 8/12/66 | 766 | 430 | 45 | <36 | S. thompson |
| 17 | 8/9/66 | 708 | 330 | 52 | <36 | Not detected |
| 18 | 8/12/66 | 326 | 91 | 39 | 36 | Not detected |
| 19 | 8/9/66 | 74 | 36 | 36 | <36 | Not detected |
| 20 | 8/12/66 | 2,012 | 1,950 | 54 | 36 | Not detected |
| 21 | 8/9/66 | 1,190 | 430 | 55 | 36 | Not detected |
| 23 | 8/15/66 | 521,000 | 240,000 | 468,500 | 190,000 | S. montevideo<br>S. blockley<br>S. california<br>S. typhi-murium<br>Var. copenhagen |
| 24 | 8/15/66 | 153 | 73 | 36 | <36 | Not detected |
| 25 | 8/15/66 | 407 | 230 | 41 | <36 | Not detected |
| 28 | 8/15/66 | 118 | 73 | 36 | <36 | Not detected |
| 29 | 8/15/66 | 483 | 36 | 36 | <36 | Not detected |

* A value of 36 was used to calculate average for < 36 values.

## TABLE 13

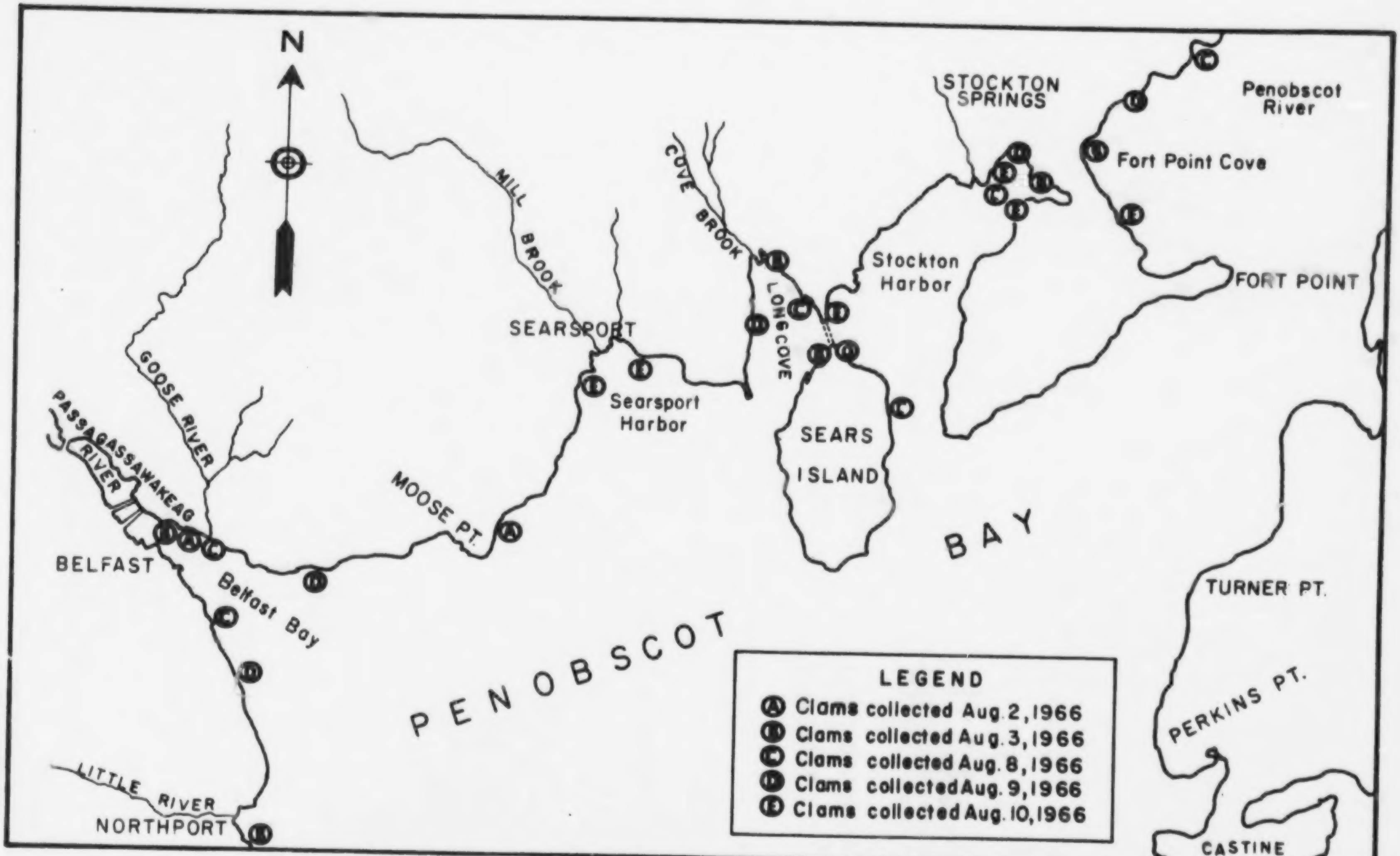
## COLIFORM BACTERIA IN CLAMS IN THE PENOBSCOT BAY AREA

| STATION | LATITUDE | LONGITUDE | DATE | TIME | COLIFORMS, MPN/100 GRAMS MEAT TOTAL | COLIFORMS, MPN/100 GRAMS MEAT FECAL |
|---|---|---|---|---|---|---|
| Stockton Harbor-east side | 44° 28' 43" | 68° 50' 48" | 8/3/66 | 0900 | 3,500 | 68 |
| Stockton Harbor-north side | 44° 28' 41" | 68° 51' 18" | 8/8/66 | 0910 | 3,500 | 3,500 |
| Stockton Harbor-northeast | 44° 29' 01" | 68° 50' 44" | 8/9/66 | 1000 | 16,000 | -- |
| Stockton Harbor-north side | 44° 28' 13" | 68° 51' 04" | 8/10/66 | 1045 | 790 | 110 |
| Stockton Harbor-east side | 44° 28' 37" | 68° 51' 00" | 8/10/66 | 0945 | 2,400 | 170 |
| Stockton Harbor-west side | 44° 27' 45" | 68° 52' 58" | 8/10/66 | 1130 | 9,200 | 790 |
| Belfast Bay-north side | 44° 25' 47" | 68° 59' 54" | 8/2/66 | 0930 | 3,400 | 120 |
| Belfast Bay-north side | 44° 25' 46" | 68° 59' 54" | 8/3/66 | 1015 | 92,000 | 3,500 |
| Little River at Rt.1-Belfast | 44° 23' 33" | 68° 58' 16" | 8/3/66 | 0730 | 9,200 | 1,300 |
| Belfast City Park | 44° 25' 07" | 68° 59' 35" | 8/8/66 | 1110 | 16,000 | 2,800 |
| Belfast Bay-mouth of Goose River | 44° 25' 46" | 68° 59' 38" | 8/8/66 | 1045 | 160,000 | 1,100 |
| Belfast Bay-south of park | 44° 24' 45" | 68° 59' 21" | 8/9/66 | 1200 | 5,400 | -- |
| Belfast Bay-north side | 44° 25' 32" | 68° 58' 26" | 8/9/66 | 1240 | 490 | < 18 |

TABLE 13 (Continued)

| STATION | LATITUDE | LONGITUDE | DATE | TIME | COLIFORMS, MPN/100 GRAMS MEAT |  |
|---|---|---|---|---|---|---|
|  |  |  |  |  | TOTAL | FECAL |
| Moose Point | 44° 25' 55" | 68° 56' 28" | 8/2/66 | 0940 | 2,400 | 230 |
| Moose Point | 44° 25' 55" | 68° 56' 28" | 8/2/66 | 0930 | 3,500 | 20 |
| Northwest tip of Sears Island | 44° 27' 27" | 68° 53' 01" | 8/3/66 | 0750 | 2,400 | 18 |
| East side Sears Island | 44° 27' 04" | 68° 52' 18" | 8/8/66 | 0850 | 7,000 | 61 |
| Northeast tip of Sears Island | 44° 27' 24" | 68° 52' 53" | 8/9/66 | 1040 | 35,000 | 490 |
| Searsport Harbor-northeast side | 44° 27' 17" | 68° 54' 59" | 8/10/66 | 1150 | 5,400 | 170 |
| Searsport Harbor-southwest side | 44° 27' 08" | 68° 55' 37" | 8/10/66 | 1210 | 3,500 | 40 |
| Long Cove-north side | 44° 28' 04" | 68° 53' 44" | 8/3/66 | 0830 | 3,500 | 1,100 |
| Long Cove-east side | 44° 27' 45" | 68° 53' 15" | 8/8/66 | 0930 | 2,400 | 45 |
| Long Cove-southwest side | 44° 27' 39" | 68° 53' 48" | 8/9/66 | 1105 | 490 | 20 |
| Fort Point Cove | 44° 29' 00" | 68° 50' 15" | 8/3/66 | 0910 | 35,000 | 3,500 |
| Fort Point Cove | 44° 29' 46" | 68° 49' 07" | 8/8/66 | 1000 | 17,000 | 11,000 |
| Fort Point Cove | 44° 29' 29" | 68° 49' 48" | 8/9/66 | 0915 | 54,000 | 9,200 |
| Fort Point Cove | 44° 28' 36" | 68° 50' 00" | 8/10/66 | 1030 | 24,000 | 3,500 |

**FIGURE 35**


N
STOCKTON SPRINGS
Penobscot River
Fort Point Cove
FORT POINT
Stockton Harbor
COVE BROOK
LONG COVE
MILL BROOK
SEARSPORT
Searsport Harbor
SEARS ISLAND
BAY
GOOSE RIVER
PASSAGASSAWAKEAG RIVER
MOOSE PT.
BELFAST
Belfast Bay
PENOBSCOT
TURNER PT.
PERKINS PT.
LITTLE RIVER
NORTHPORT
CASTINE
LEGEND
Clams collected Aug. 2, 1966
Clams collected Aug. 3, 1966
Clams collected Aug. 8, 1966
Clams collected Aug. 9, 1966
Clams collected Aug. 10, 1966

LOCATION OF CLAM SAMPLES TAKEN FOR BACTERIOLOGICAL ANALYSIS counts. Belfast Bay clam samples were generally very high, as would be expected, since the total coliform counts were high. Moose Point samples show that there can be a wide range of values at the same sampling point at the same time. Limited samples in Searsport Harbor indicate that the clam meat was below the maximum value recommended. Long Cove area samples show that the clams themselves are still fairly clean bacteriologically except for the area in the north end. Cove Brook (Station 36) was found to be polluted, which probably accounts for the high fecal coliform value found in the clams in this area. Finally, Fort Point had the highest values reported; all samples showed that the clams were grossly polluted. The standards for harvesting shellfish are based on the water and not on the clam itself.

The presence of coliform bacteria in the waters emphasizes the need for adequate pollution abatement and reaffirms the necessity for continuous and effective waste treatment which will remove Salmonellae and other pathogenic bacteria.

## SUSPENDED SOLIDS

Excessive suspended solids in a stream or bay diminish the beauty of the water and settle to the bottom,

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where they form sludge deposits. These deposits can deplete the water's oxygen supply and produce offensive odors, especially in tidal areas where the sludge banks are exposed at low tide. The solids blanket the bottom and smother the biological life upon which fish feed, and change the bottom environment so that clams, lobsters, scallops and other aquatic life no longer can live in that area. This apparently has happened in the Belfast Bay area, where a few years ago the lobster and scallop harvest was much more abundant than it is at the present time.

The area near the western part of Stockton Harbor in Searsport is receiving wastes that contain silica and other materials which are smothering the clams. The solid material is discharged by Northern Chemical Industries, Inc., and has an estimated suspended solids population equivalent to the discharge of 20,000 persons. The Penobscot River is receiving tremendous loads of suspended solids equivalent to the discharge of over 591,000 persons. These solids, which cause sludge banks to develop, are discharged from the untreated wastes of Bangor; S. A. Maxfield Company, Bangor; Brewer; Standard Packaging Corp., Brewer; Hampden, Winterport; Frankport; Bucksport; and St. Regis Paper Company, Bucksport.

A stream bottom should be free of pollutants that will adversely alter the compositon of the bottom fauna, interfere with the spawning of fish or their eggs, or adversely change the physical or chemical nature of the bottom. The environment of parts of the upper Penobscot Bay area is far from this type.

## BIOCHEMICAL OXYGEN DEMAND AND DISSOLVED OXYGEN

The oxygen demand of sewage and industrial wastes, as measured by the biochemical oxygen demand (BOD) test, indicates the potential for reducing the dissolved oxygen (DO) content of streams. If the dissolved oxygen is reduced below an adequate level, clams, the fish population, crustaceans such as lobsters, and the aquatic life on which the higher forms of aquatic life feed are killed or driven out of the area.

Most water pollution control agencies have adopted a minimum 5 mg/1 DO objective to maintain the maximum potential warm water sport fish population. The State of Maine water quality standard for Class C water requires the dissolved oxygen to be 5.0 mg/1 for tidal waters.

If dissolved oxygen becomes totally depleted, obnoxious odors, mostly from hydrogen sulfide, result, causing an unpleasant environment for persons living or working nearby. The hydrogen sulfide given off by the streams may turn nearby houses, bridges, or other painted structures black.

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The Maine Water Improvement Commission found that the dissolved oxygen placed the Penobscot River either in the nuisance condition or in Class D from Bangor to Bucksport. Zero DO was found from Bangor to Winterport during the summer of 1963, with the oxygen sag curve moving downstream at low tide and upstream at high tide. This dissolved oxygen condition limits usage of the entire river below Bangor and prevents fish, including anadromous fish such as salmon, from passing through these waters. Materials causing low dissolved oxygen values in the Penobscot River are discharged by Bangor; S. A. Maxfield Co., Bangor; Brewer; Standard Packaging Corp., Brewer; Hampden, Winterport; Frankfort; Bucksport; and St. Regis Paper Co., Bucksport.

At least one fish kill has been reported due to wastes discharged to Goose River.

SULFITE WASTE LIQUOR

The high sulfite waste liquor concentrations in the Penobscot River are primarily from the processing of pulp using the sulfite process. Standard Packaging Corporation and St. Regis Paper Company both use the sulfite process as do other pulp processing companies above Bangor. Sulfite waste liquor adds material that causes color in waters. Such

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discoloration of a water reduces its esthetic quality.

Work has been carried out in the Northwest on the effects of pulp mill wastes on oysters. The toxicity of low concentrations of sulfite waste liquor to the oysters has been clearly shown. (7) Tests showed that embryonic development of the Olympia oyster from eggs to shelled larvae did not take place in concentrations above 10 ppm. Long-term bioassays with Olympia oysters of one to three years old indicated that low concentrations of sulfite waste liquor (approximately 10 ppm) increase the mortality of these shellfish.

Other studies with Pacific oyster larvae showed 100 percent mortality when sulfite waste liquor exceeded 80 ppm. ([illegible]) Fifty percent mortality was produced at a concentration of 30 ppm.

Most of the upper Penobscot Bay area had sulfite waste liquor concentrations near 60 ppm and at low tide near Fort Point the value was about 100 ppm. See Figure 22. This high concentration near the Fort Point Cove area could be the reason that the clam resources are somewhat less than they were in the past. Stockton Springs fishermen confirmed that this area was a rich clamming area before 1950.(9) Sulfite waste liquor is discharged in the study area by Standard Packaging Corp., Brewer, and St. Regis Paper Co., Bucksport.

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The Atlantic Salmon Commission in Maine is planning a program to restore salmon to the Penobscot River. (10) However, salmon as well as other fish will avoid areas where the sulfite waste liquor concentrations are high. Juvenile Chinook salmon have been reported to have an avoidance to sulfite waste liquor in concentrations above 125 ppm.(11)

## FUTURE WATER QUALITY

Under existing Maine laws, the Maine Legislature is the organization that officially classifies State waters according to water use and quality standards. The Maine Water Improvement Commission makes recommendations to the Legislature after studies of present and potential water uses and water quality. The classification for water uses, as voted by the Maine Legislature, was completed in 1965. It is shown in Figure 36. Tables A-1 and A-2 in the Appendix describe the Maine standards for both fresh and marine waters. Marine waters include estuaries and upstream tidal waters that have a salinity of 5,000 parts per million or greater at high tide.

The majority of the upper Penobscot Bay area has been classified as Class SB-1, which has as an upper limit for total coliform bacteria a median value of not more than 240 MPN/100 ml. Class SB-1 waters, however, will not permit

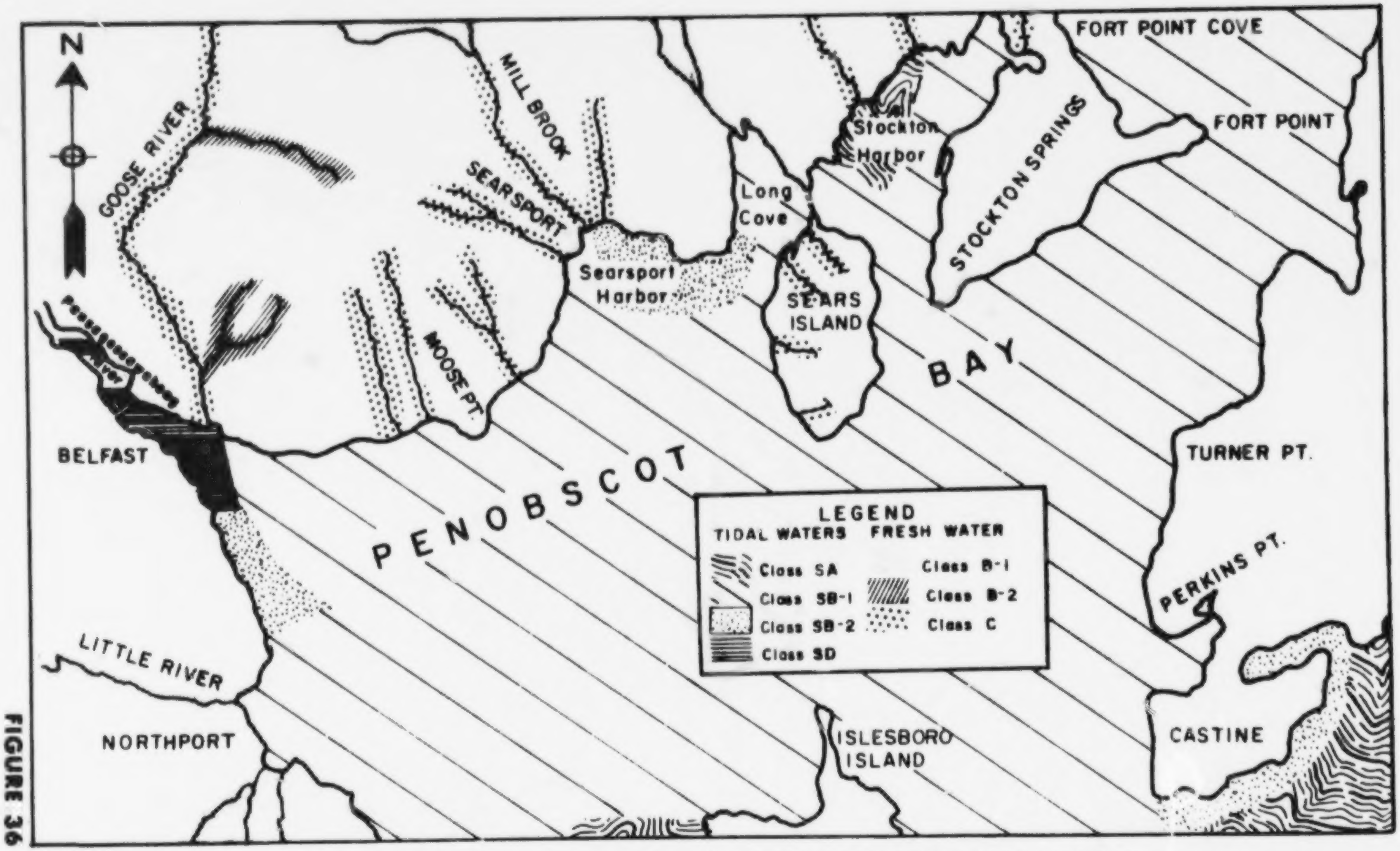
N
GOOSE RIVER
MILL BROOK
SEARSPORT
Searsport Harbor
MOOSE PT.
Long Cove
SEARS ISLAND
Stockton Harbor
STOCKTON SPRINGS
FORT POINT COVE
FORT POINT
BAY
PENOBSCOT
BELFAST
TURNER PT.
PERKINS PT.
LITTLE RIVER
NORTHPORT
ISLESBORO ISLAND
CASTINE
LEGEND
TIDAL WATERS
Class SA
Class SB-1
Class SB-2
Class SD
FRESH WATER
Class B-1
Class B-2
Class C

FIGURE 36

CLASSIFICATION OF WATERS IN UPPER PENOBSCOT BAY AREA the harvesting of shellfish. On the other hand, Class SA waters, found in a small part of Searsport in Stockton Harbor and the western side of Islesboro Island below Marshall Point, have a median total coliform limit of 70 MPN/100 ml and permit the harvesting of shellfish. Except for these two small areas the remainder of the study area cannot be used for the taking of shellfish, since it is legal to exceed 70 MPN/100 ml in the waters overlying a shellfish bed. Therefore, the Maine water quality standards should be upgraded to reflect the beneficial water uses in the area.

Part of Belfast Bay has been assigned a Class SD status. Under the Maine revised statutes of 1964, (12) Class SD waters, the lowest classification, shall be considered as primarily devoted to the disposal of sewage and industrial wastes without causing a public nuisance. It seems unreasonable to classify the area for this purpose since means are presently available to correct the pollutional problem.

The Maine Water Improvement Commission classification report (5) recommended that the Penobscot River from the Bangor Dam to the Route 1 bridge at Verona be Class C. The final classifications were Class C from the Bangor Dam to Hampden Highlands, and Class SC from Hampden Highlands area to the Route 1 bridge in Verona.

The report also recommended that the Penobscot River be classified SC from the Route 1 bridge at Verona to the southerly point of Verona Island and have a maximum coliform concentration of 1,000 MPN per 100 ml and a median of no more than 240 MPN/100 ml. Final classifications did not include a numerical bacteriological limit. The recommendation on classification of the Penobscot River from Verona to Fort Point in Stockton Springs was Class SB-1 with the coliform limit a median of 70 MPN/100 ml. Actual classification for this section limits the median to 240 MPN/100 ml.

Classes SA, SB-1 and SB-2 contain a provision that there shall be no toxic wastes or colored wastes that either singly or in combination with other substances act to be injurious to edible fish or shellfish or to their culture or propagation. The sulfite waste liquor fits into the above category since it can be deleterious to fish and shellfish in the concentrations found in the Penobscot River and upper Penobscot Bay.

In considering the water quality of a stream, attention should be given not only to present population, industrial discharges, and water uses, but also to future population, expansion of industrial capacity, the possible introduction of new industries into the area, and potential water uses expected to develop. Water quality should be sufficiently high that economic growth is not hindered and that the maximum beneficial use is made of the stream.

Waste discharges must be controlled to allow economic growth in the area, including more recreational use, and the reopening of the shellfish growing areas. To achieve those objectives the principal controls need to be placed on discharges of bacteria, materials causing oxygen demand, suspended solids, floating material such as feathers, grease, and wood fibers, and toxic materials such as sulfite waste liquor.

Water quality requirements must be applied in the communities of Northport, Searsport, Stockton Springs, Penobscot, Castine, Islesboro, Belfast east of Goose River, and Belfast south of latitude 44°24'N to permit the following uses:

Shellfish Production
Lobster Production
Commercial Fishing, including anadromous fish
Aesthetics
Industrial - Processing and Cooling
Recreation - Whole Body Contact
Sport Fishing
Pleasure Boating
Wildlife
Navigation

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Water quality requirements must be applied in Belfast west of Goose River and in Belfast north of latitude 44°24'N to permit the following water uses:

Lobster Production
Commercial Fishing
Aesthetics
Industrial Water - Processing and Cooling
Recreation - Whole Body Contact
Sport Fishing
Pleasure Boating
Wildlife
Navigation

Water quality requirements must be applied in the Penobscot River from the Bangor Dam to the southern tip of Verona Island to permit the following water uses:

Commercial Fishing, including anadromous fish
Aesthetics
Industrial Water - Processing and Cooling
Recreation - Limited Body Contact
Sport Fishing
Pleasure Boating
Wildlife
Navigation

The recommendations of this report will result in attainment of water quality of sufficient purity that the beneficial water uses may be accommodated.

## REFERENCES

1. Pritchard, Donald W., Estuarine Circulation Patterns, Proceedings of American Society of Civil Engineers, 81 (1955).

2. Glude, John B., Survival of Soft-Shell Clams, Mya arenaria, Buried at Various Depths, Research Bulletin No. 22, 1954, Department of Sea and Shore Fisheries, State House, Augusta, Maine.

3. Dow, Robert L., Wallace, D. E. and Taxiarchis, L. N., Clam (Mya arenaria) Breakage in Maine, Research Bulletin No. 15, Department of Sea and Shore Fisheries, State House, Augusta, Maine.

4. Wallace, D. E., Personal Communication, 1966, State of Maine, Department of Sea and Shore Fisheries.

5. Penobscot River Classification Report, 1963, State of Maine, Water Improvement Commission.

6. Salmonella Surveillance Report, Annual Summary-1964, Communicable Disease Center, U. S. Department of Health, Education, and Welfare, Atlanta, Georgia.

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7. Woelke, Charles E., Bioassays of Pulp Mill Wastes with Oysters, Biological Problems in Water Pollution, U. S. Department of Health, Education and Welfare, Cincinnati, Ohio, 1965.

8. Personal Communication, Earl N. Kari, U. S. Department of the Interior, FWPCA, Portland, Oregon, July 25, 1966.

9. Saunders, James C., Portland Sunday Telegram, August 7, 1966.

10. Letter, Richard F. Griffith, U. S. Fish and Wildlife Service to Lester M. Klashman, Federal Water Pollution Control Administration, September 9, 1966.

11. Avoidance Reactions of Salmonoid Fishes to Pulp Mill Effluents, Jones, B. F., Warren, Charles E., Bond, Carl E. and Doudoroff, Peter, Sewage and Industrial Wastes, 28, November 1956.

12. Revised Statutes of 1964, Title 38, Chapter 3, Article 1.

# APPENDIX

## STATE OF MAINE

## DEPARTMENT OF SEA AND SHORE FISHERIES

## PUBLIC NOTICE

Acting under authority vested in the Commissioner of Sea and Shore Fisheries of the State of Maine by R. S. 1964, Title 12, Section 3503, the following regulations closing certain shores, flats and waters in the towns of Searsport and Stockton Springs, Waldo County, designated as Closed Area No. 33, Searsport, promulgated March 24, 1965; Closed Area No. 33-A, Sears Island, promulgated May 18, 1961; and Closed Area No. 34, Cape Jellison, Stockton Springs, promulgated June 6, 1961, to all digging of clams, quahogs, oysters, mussels and other marine mollusks are hereby repealed and replaced by the following regulation to become effective July 1, 1966.

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## REGULATION

Closed Area No. 33; Searsport-Stockton Springs:

Because of pollution it shall be unlawful to dig or take in any manner any clams, quahogs, oysters, mussels and other marine mollusks from all shores, flats and waters of that portion of Penobscot Bay, Searsport and Stockton Springs, including Sears Island and Cape Jellison, Waldo County, between a red painted wood post located approximately 500 yards southwesterly of the old Steamboat Wharf, Searsport, and a red painted wood post located on the western shore of the Penobscot River at Fort Point, Stockton Springs.

Whoever violates any provision of this regulation shall be subject to a fine of not less than $10.00 nor more than $300.00 or by imprisonment for not more than 90 days, or by both.

Dated at Augusta, Maine, this twenty-eighth day of June, A. D. 1966.

RONALD W. GREEN

Commissioner of Sea and Shore Fisheries

TABLE A-1

## MAINE WATER IMPROVEMENT COMMISSION CLASSIFICATION AND STANDARDS OF QUALITY FOR FRESH WATER

| | CLASS A | CLASS B | | CLASS C | CLASS D |
|---|---|---|---|---|---|
| | | CLASS B-1 | CLASS B-2 | | |
| | | SUITABILITY FOR USE | | | |
| | Suitable for any use. Character uniformly excellent. | Suitable for all forms of recreation and industrial uses. Acceptable for public water after adequate treatment. | | Suitable for recreational boating, fishing, industrial use, and potable water supplies after adequate treatment. | Suitable for transportation of sewage and industrial wastes without causing a public nuisance. |
| | | STANDARDS OF QUALITY | | | |
| Dissolved oxygen | Not less than 75% saturation. | Not less than 75% saturation. | Not less than 60% saturation. | Not less than 5 ppm for trout and salmon streams. Not less than 4 ppm for other streams. | Present at all times. |
| Coliform bacteria | Median not more than 100 MPN/ 100 ml. | Median not more than 300 MPN/ 100 ml. | Median not more than 1,000 MPN/ 100 ml. | Not harmful to public health. | Not harmful to public health. |
| Oil and Grease | None | None | None | None | Not objectionable. |
| Odor, scum, floating solids, or debris. | None | None | None | None | Not objectionable. |
| Sludge deposits. | None | None | None | None | Not objectionable. |
| Chemical wastes | Only amounts that are not injurious to aquatic life. | Only amounts that are not injurious to aquatic life. | | Shall not be inimical to aquatic life. | Not harmful to public health. |

TABLE A-2

## MAINE WATER IMPROVEMENT COMMISSION CLASSIFICATION AND STANDARDS OF QUALITY FOR TIDAL OR MARINE WATERS

| | | CLASS SB | | | |
|---|---|---|---|---|---|
| | CLASS SA | CLASS SB-1 | CLASS SB-2 | CLASS SC | CLASS SD |
| | | SUITABILITY FOR USE | | | |
| | Suitable for any water use. Character uniformly excellent. | Bathing and other clean water uses. | Best usage, recreational usages, except bathing; and fisheries. | Suitable for recreational boating, fishing and other similar uses except bathing. | Suitable for transportation of sewage and industrial wastes without a public nuisance. |

| | | STANDARDS OF QUALITY | | | |
|---|---|---|---|---|---|
| Coliform bacteria | Median not more than 70 MPN/ 100 ml. | Median not more than 240 MPN/ 100 ml. | Median not more than 1,000 MPN/ 100 ml. | Not harmful to public health. | Not harmful to public health. |
| Dissolved oxygen | Not less than 6.0 ppm. | Not less than 6.0 ppm. | Not less than 6.0 ppm. | Not less than 5.0 ppm. | Present at all times. |
| Oil and grease | None | None | None | None | Not objectionable. |
| Odor, scum, floating solids or debris. | None | None | None | None | Not objectionable. |
| Sludge deposits | None | None | None | None | Not objectionable. |
| Temperature, colored or toxic substances. | Only amounts that are not injurious to edible fish or shellfish or to their propagation. | Only amounts that are not injurious to edible fish or shellfish or to their propagation. | | Only amounts not inimical to aquatic life. | Not objectionable. |

## TABLE A-3

## LATITUDE & LONGITUDE OF SAMPLING STATIONS
## PENOBSCOT BAY AREA - JULY-AUGUST, 1966

| STATION | LATITUDE | LONGITUDE |
|---|---|---|
| 1 | 44° 24' 05" | 68° 58' 49" |
| 2 | 44° 24' 14" | 68° 58' 29" |
| 3 | 44° 24' 38" | 68° 58' 00" |
| 4 | 44° 25' 05" | 68° 57' 28" |
| 5 | 44° 25' 31" | 68° 57' 00" |
| 6 | 44° 22' 48" | 68° 57' 52" |
| 7 | 44° 23' 46" | 68° 57' 08" |
| 8 | 44° 24' 16" | 68° 56' 42" |
| 9 | 44° 25' 02" | 68° 56' 12" |
| 10 | 44° 25' 22" | 68° 55' 42" |
| 11 | 44° 28' 07" | 68° 48' 26" |
| 12 | 44° 27' 47" | 68° 47' 34" |
| 13 | 44° 26' 16" | 68° 52' 45" |
| 14 | 44° 26' 03" | 68° 50' 39" |
| 15 | 44° 25' 45" | 68° 49' 17" |
| 16 | 44° 27' 03" | 68° 51' 02" |
| 17 | 44° 27' 47" | 68° 52' 27" |
| 18 | 44° 28' 30" | 68° 51' 23" |
| 19 | 44° 28' 51" | 68° 51' 00" |
| 20 | 44° 25' 04" | 68° 52' 30" |
| 21 | 44° 23' 56" | 68° 52' 45" |
| 22 | 44° 25' 37" | 68° 59' 46" |
| 23 | 44° 25' 35" | 69° 00' 02" |
| 24 | 44° 25' 57" | 68° 56' 02" |
| 25 | 44° 25' 38" | 68° 54' 59" |
| 26 | 44° 25' 21" | 68° 53' 34" |
| 27 | 44° 26' 34" | 68° 54' 38" |
| 28 | 44° 27' 00" | 68° 55' 21" |
| 29 | 44° 27' 39" | 68° 53' 16" |
| 30 | 44° 23' 21" | 68° 47' 28" |
| 31 | 44° 25' 51" | 68° 59' 36" |
| 32 | 44° 27' 18" | 68° 55' 33" |
| 33 | 44° 27' 26" | 68° 55' 22" |
| 34 | 44° 27' 27" | 68° 55' 18" |
| 35 | 44° 27' 30" | 68° 55' 15" |
| 36 | 44° 28' 10" | 68° 53' 49" |
| 37 | 44° 28' 48" | 68° 51' 29" |
| 38 | 44° 28' 49" | 68° 50' 36" |
| 39 | 44° 28' 34" | 68° 50' 43" |

## TABLE A-4

## CHLORIDE & SALINITY DATA FOR PENOBSCOT BAY STUDY
## HIGH TIDE

| STATION | CHLORIDE, PPT | | | SALINITY, PPT | | |
|---|---|---|---|---|---|---|
| | MIN. | AVG. | MAX. | MIN. | AVG. | MAX. |
| 1 | 14.0 | 14.5 | 14.8 | 25.3 | 26.2 | 26.7 |
| 2 | 13.5 | 14.5 | 15.5 | 24.4 | 26.2 | 27.1 |
| 3 | 13.5 | 14.3 | 15.5 | 24.4 | 25.8 | 27.6 |
| 4 | 13.5 | 14.4 | 15.2 | 24.4 | 26.0 | 27.4 |
| 5 | 11.5 | 13.9 | 15.0 | 20.8 | 25.1 | 27.1 |
| 6 | 14.5 | 14.8 | 15.3 | 26.2 | 26.7 | 28.0 |
| 7 | 13.5 | 14.2 | 15.1 | 24.4 | 25.6 | 27.2 |
| 8 | 14.0 | 14.4 | 15.2 | 25.3 | 26.0 | 27.4 |
| 9 | 13.5 | 14.4 | 15.0 | 24.4 | 26.0 | 27.1 |
| 10 | 13.5 | 14.3 | 15.0 | 24.4 | 25.8 | 27.1 |
| 11 | 13.6 | 14.3 | 15.2 | 24.7 | 25.8 | 27.4 |
| 12 | 14.5 | 14.8 | 15.1 | 26.2 | 26.7 | 27.2 |
| 13 | 14.4 | 14.8 | 15.2 | 26.0 | 26.7 | 27.4 |
| 14 | 14.6 | 15.1 | 15.5 | 26.4 | 27.2 | 28.0 |
| 15 | 15.1 | 15.3 | 15.5 | 27.2 | 27.6 | 27.8 |
| 16 | 14.3 | 14.6 | 15.0 | 25.8 | 26.4 | 27.1 |
| 17 | 14.5 | 14.8 | 15.4 | 26.2 | 26.7 | 27.8 |
| 18 | 14.5 | 14.8 | 15.2 | 26.2 | 26.7 | 27.4 |
| 19 | 14.6 | 14.9 | 15.2 | 26.4 | 26.9 | 27.4 |
| 20 | 14.7 | 15.0 | 15.6 | 26.5 | 27.1 | 28.2 |
| 21 | 14.9 | 15.1 | 15.6 | 26.9 | 27.2 | 28.2 |
| 22 | 14.5 | 15.5 | 16.4 | 26.2 | 28.0 | 29.6 |
| 23 | 13.1 | 14.0 | 16.1 | 23.6 | 25.3 | 29.1 |
| 24 | 14.6 | 15.5 | 16.0 | 26.7 | 28.0 | 28.9 |
| 25 | 15.3 | 15.7 | 16.1 | 27.6 | 28.3 | 29.1 |
| 26 | 14.5 | 15.2 | 16.1 | 26.2 | 27.4 | 29.1 |
| 27 | 14.7 | 15.3 | 16.0 | 26.5 | 27.6 | 28.9 |
| 28 | 14.7 | 15.4 | 16.0 | 26.5 | 27.8 | 28.9 |
| 29 | 14.6 | 15.1 | 15.8 | 26.4 | 27.2 | 28.5 |
| 30 | 15.7 | 16.0 | 16.3 | 28.3 | 28.9 | 29.4 |

## TABLE A-5

## CHLORIDE & SALINITY DATA FOR PENOBSCOT BAY STUDY
## EBB TIDE

| STATION | CHLORIDE, PPT MIN. | CHLORIDE, PPT AVG. | CHLORIDE, PPT MAX. | SALINITY, PPT MIN. | SALINITY, PPT AVG. | SALINITY, PPT MAX. |
|---|---|---|---|---|---|---|
| 1 | 14.0 | 14.5 | 15.0 | 25.3 | 26.2 | 27.1 |
| 2 | 14.0 | 14.4 | 15.0 | 25.3 | 26.0 | 27.1 |
| 3 | 14.0 | 14.7 | 15.5 | 25.3 | 26.5 | 28.0 |
| 4 | 14.0 | 14.4 | 15.4 | 25.3 | 26.0 | 27.8 |
| 5 | 14.5 | 14.8 | 15.4 | 27.1 | 26.7 | 28.5 |
| 6 | 14.0 | 14.6 | 15.4 | 25.3 | 26.4 | 27.8 |
| 7 | 13.5 | 14.5 | 15.2 | 24.4 | 26.2 | 27.4 |
| 8 | 13.5 | 14.4 | 15.4 | 24.4 | 26.0 | 27.8 |
| 9 | 14.0 | 14.6 | 15.2 | 25.3 | 26.4 | 27.4 |
| 10 | 13.5 | 14.4 | 15.0 | 24.4 | 26.0 | 27.1 |
| 11 | 12.7 | 13.7 | 14.9 | 22.9 | 24.7 | 26.9 |
| 12 | 11.9 | 13.2 | 14.9 | 21.5 | 23.8 | 26.9 |
| 13 | 14.2 | 14.6 | 15.1 | 25.6 | 26.4 | 27.3 |
| 14 | 12.6 | 14.1 | 15.4 | 22.7 | 25.4 | 27.8 |
| 15 | 13.4 | 14.5 | 15.5 | 24.2 | 26.2 | 28.0 |
| 16 | 14.2 | 15.2 | 17.1 | 25.6 | 27.4 | 30.9 |
| 17 | 14.3 | 14.8 | 15.3 | 25.8 | 26.7 | 27.6 |
| 18 | 14.5 | 14.8 | 15.0 | 27.1 | 26.7 | 27.1 |
| 20 | 14.3 | 14.7 | 15.3 | 25.8 | 26.5 | 27.6 |
| 21 | 14.2 | 15.0 | 16.0 | 25.6 | 27.1 | 28.9 |
| 22 | 14.6 | 15.4 | 16.5 | 26.4 | 27.8 | 29.8 |
| 23 | 7.42 | 11.3 | 13.0 | 13.4 | 20.4 | 23.5 |
| 24 | 14.6 | 15.4 | 16.0 | 26.4 | 27.8 | 28.9 |
| 25 | 14.9 | 15.4 | 16.0 | 26.9 | 27.8 | 28.9 |
| 26 | 14.7 | 15.4 | 15.9 | 26.5 | 27.8 | 28.7 |
| 27 | 14.7 | 15.3 | 16.1 | 26.5 | 27.6 | 29.1 |
| 28 | 14.6 | 15.2 | 15.8 | 26.4 | 27.4 | 28.5 |
| 29 | 14.8 | 15.1 | 15.7 | 26.7 | 27.3 | 28.3 |
| 30 | 14.6 | 16.0 | 17.4 | 26.4 | 28.9 | 31.4 |

## TABLE A-6

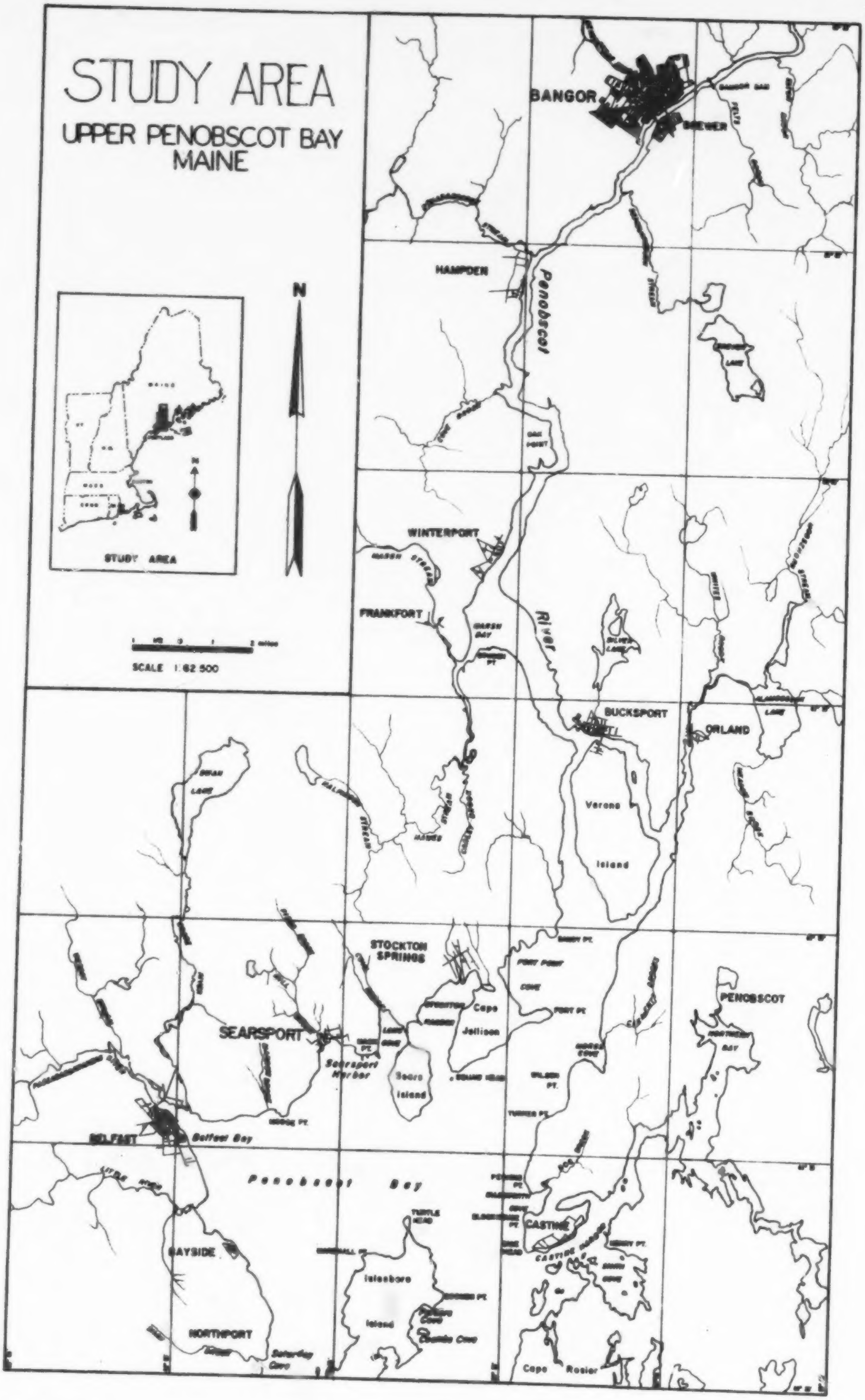
## CHLORIDE & SALINITY DATA FOR PENOBSCOT BAY STUDY
## LOW TIDE

| | CHLORIDE, PPT | | | SALINITY, PPT | | |
|---|---|---|---|---|---|---|
| STATION | MIN. | AVG. | MAX. | MIN. | AVG. | MAX. |
| 1 | 14.0 | 14.4 | 15.0 | 25.3 | 26.0 | 27.1 |
| 2 | 14.0 | 14.6 | 15.0 | 25.3 | 26.4 | 27.1 |
| 3 | 13.5 | 14.5 | 15.1 | 24.4 | 26.2 | 27.2 |
| 4 | 13.5 | 14.7 | 15.2 | 24.4 | 26.5 | 27.4 |
| 5 | 13.5 | 14.7 | 16.0 | 24.4 | 26.5 | 28.9 |
| 6 | 14.0 | 14.7 | 15.5 | 25.3 | 26.5 | 28.0 |
| 7 | 13.5 | 14.4 | 15.1 | 24.4 | 26.0 | 27.2 |
| 8 | 13.5 | 14.5 | 15.1 | 24.4 | 26.2 | 27.2 |
| 9 | 13.5 | 14.4 | 15.0 | 24.4 | 26.0 | 27.1 |
| 10 | 13.5 | 14.5 | 15.2 | 24.4 | 26.2 | 27.4 |
| 11 | 13.1 | 13.7 | 14.3 | 23.6 | 24.7 | 25.8 |
| 12 | 13.4 | 13.8 | 14.0 | 24.2 | 24.9 | 25.3 |
| 13 | 14.2 | 14.5 | 15.0 | 25.6 | 26.2 | 27.1 |
| 14 | 13.4 | 13.8 | 14.4 | 24.2 | 24.4 | 26.0 |
| 15 | 14.0 | 14.3 | 14.6 | 25.3 | 25.8 | 26.4 |
| 16 | 14.5 | 14.8 | 15.2 | 26.2 | 26.7 | 27.4 |
| 17 | 14.3 | 14.8 | 15.4 | 25.8 | 26.7 | 27.8 |
| 18 | 14.5 | 14.6 | 15.1 | 26.2 | 26.7 | 27.2 |
| 20 | 13.3 | 14.2 | 15.8 | 24.0 | 25.6 | 28.5 |
| 21 | 13.2 | 14.4 | 15.0 | 23.8 | 26.0 | 27.1 |
| 22 | 14.6 | 15.5 | 16.5 | 26.4 | 28.0 | 29.8 |
| 23 | 6.44 | 10.5 | 14.6 | 11.6 | 19.0 | 26.4 |
| 24 | 14.8 | 15.6 | 16.1 | 26.7 | 28.2 | 29.1 |
| 25 | 15.1 | 15.6 | 15.9 | 27.2 | 28.2 | 28.7 |
| 26 | 14.6 | 15.3 | 15.9 | 26.4 | 27.6 | 28.7 |
| 27 | 14.7 | 15.5 | 16.0 | 26.5 | 28.0 | 28.9 |
| 28 | 14.9 | 15.5 | 16.0 | 26.9 | 28.0 | 28.9 |
| 29 | 14.7 | 15.2 | 15.7 | 26.5 | 27.4 | 28.3 |
| 30 | 14.8 | 16.6 | 17.3 | 26.7 | 30.0 | 31.2 |

## TABLE A-7

## TEMPERATURES OF PENOBSCOT BAY BACTERIA SAMPLES
7/27/66 - 8/16/66

| STATION | TEMPERATURE, °C<br>MINIMUM | <br>AVERAGE | <br>MAXIMUM |
|---|---|---|---|
| 1 | 15.5 | 17.2 | 19.0 |
| 2 | 15.0 | 17.0 | 18.8 |
| 3 | 15.0 | 16.7 | 18.0 |
| 4 | 15.0 | 16.5 | 18.0 |
| 5 | 15.0 | 16.4 | 18.5 |
| 6 | 15.5 | 16.8 | 18.5 |
| 7 | 15.0 | 16.5 | 18.0 |
| 8 | 15.0 | 16.2 | 17.5 |
| 9 | 13.5 | 16.0 | 18.5 |
| 10 | 14.5 | 15.7 | 17.5 |
| 11 | 13.5 | 14.7 | 16.5 |
| 12 | 13.5 | 15.0 | 16.5 |
| 13 | 14.0 | 15.4 | 16.5 |
| 14 | 13.5 | 14.8 | 16.0 |
| 15 | 13.5 | 14.8 | 16.5 |
| 16 | 15.5 | 16.6 | 18.5 |
| 17 | 15.0 | 17.1 | 19.5 |
| 18 | 16.0 | 18.2 | 20.0 |
| 19 | 14.0 | 18.4 | 20.0 |
| 20 | 14.0 | 15.3 | 16.5 |
| 21 | 14.0 | 15.6 | 17.5 |
| 22 | 16.0 | 18.3 | 20.0 |
| 23 | 15.5 | 17.8 | 18.0 |
| 24 | 14.0 | 16.7 | 17.5 |
| 25 | 13[illegible] | 16.2 | 17.5 |
| 26 | 15.0 | 15.3 | 18.0 |
| 27 | 15.0 | 16.7 | 18.5 |
| 28 | 16.0 | 17.1 | 18.5 |
| 29 | 16.0 | 17.6 | 19.5 |
| 30 | 12.5 | 13.9 | 15.0 |



STUDY AREA
UPPER PENOBSCOT BAY
MAINE
STUDY AREA
N
SCALE 1:62,500
BANGOR
BREWER
HAMPDEN
Penobscot
River
WINTERPORT
FRANKFORT
BUCKSPORT
ORLAND
Verona
Island
STOCKTON
SPRINGS
Cape
Jellison
SEARSPORT
Searsport
Harbor
Sears
Island
PENOBSCOT
BELFAST
Belfast Bay
Penobscot Bay
BAYSIDE
NORTHPORT
Islesboro
Island
CASTINE
Cape Rosier

FIGURE 1

That completes my statement, Mr. Chairman.

MR. STEIN: Thank you.

Are there any comments or questions?

MR. MAC DONALD: No.

MR. KLASHMAN: No, I have none.

MR. STEIN: Thank you very much, Mr. Pahren.

At this point, we will recess for ten minutes.

(Whereupon a recess was had.)

MR. STEIN: May we reconvene?

Mr. Klashman?

MR. KLASHMAN: We will now hear from other Federal agencies.

The order in which I am going to call them, so that we can save time and you might be ready to come on when the previous speaker is finished, will be Mr. Abelson, Mr. Griffith, Mr. Bonkoski and Mr. Larson. If Captain Hagadorn of the Coast Guard wishes to make a statement, we will hear from him.

Mr. Abelson.

STATEMENT OF MARK ABELSON, REGIONAL COORDINATOR,
UNITED STATES DEPARTMENT OF THE INTERIOR

MR. ABELSON: Chairman Stein, Conferees, Ladies and Gentlemen:

I am Mark Abelson, Regional Coordinator for the Northeast Region, United States Department of the Interior.

The Department of the Interior is the Nation's primary agency charged with responsibility for a wide variety of programs for the management, conservation and development of the natural resources which benefit every section of the Nation. For this reason, it can best be described as a "Department of Natural Resources."

The Department is made up of some three dozen bureaus and offices, whose functions and responsibilities cover the entire range of natural and human resources. In the Northeast, coordination of these functions and responsibilities is accomplished through my office in Boston.

The broad scope of the Department's functions is indicated by the following brief listing of its principal activities: The Department has direct responsibility for some 550 million acres of Federally owned lands and administers the mining and mineral leasing laws on other lands; it irrigates more than 8 million acres of reclaimed lands in the West; manages hydroelectric power systems with a capacity of approximately 13 million kilowatts; protects fish and wildlife resources; conserves hundreds of vital scenic, historic, and park areas; coordinates and advances outdoor recreation programs; conducts geologic research, hydrologic investigations, and topographic surveys; promotes more efficient mining and processing methods and mine safety; encourages mineral exploration and conducts mineral, fuel and saline water research; provides grants for water resources research; administers oil import programs; operates helium plants and Alaska Railroad; works for the welfare of about 180,000 peole in areas administered by the United States; exercises trusteeship for the well-being of about 380,000 Indians, Aleuts and Eskimos along with resource management on about 50 million acres of Indian owned lands; and administers grants, conducts research, and administers enforcement provisions for water pollution control.

In carrying out these vital responsibilities for sound management of natural resources, the Department encourages efficient resources use; works to assure that a sound resource base is provided to meet the needs of our expanding economy, our national security, and our future generations; promotes an equitable distribution of benefits from nationally owned resources; and seeks to prevent wasteful exploitation of resources.

The Department has a definite interest in all waters of the country and in the entire pollution problem.

Water, and its associated opportunities and problems, ignore State, **Regional** and international boundaries. It is important that the interrelationships of water be so recognized and that the efforts of all concerned plans for the best use of this valuable resource.

The focus of the efforts of the Department of the Interior is directed to the maintenance of adequate national water supplies and adequate water quality for whatever uses man may wish to make of this resource. The Interior approach emphasizes the coordination and interrelation between uses and the effect of these uses on management and the quality of the total water supply system. We hope we can make it possible for the country to remain as an affluent, not the effluent society.

Maintenance of water quality involves not only the quality levels of human consumption, but also quality levels for consumption by other animal and plant life, for development of other natural resources, and for industrial processes. These quality considerations are interrelated. They can be understood and controlled best from the point of view of water as a resource, rather than from the point of view of a particular quality need.

All waters in rivers, lakes, bays and estuaries should be as clean as possible, not as unclean as admissible. In handling water problems over a period of years, the

Department has accumulated a great deal of experience. It has the facilities and the qualified manpower to deal with a wide variety of water problems. The broad interests of the Department in water quality and related problems in the Penobscot River and estuary are reflected in the Department's agencies, which include the Water Pollution Control Administration. While each of these agencies has its own program, the Department exercises the administration necessary to assure that all programs are coordinated to achieve the best overall results.

Interior Bureaus, in addition to the Water Pollution Control Administration, carry on water quality studies related to the physical, chemical, and biological adequacy of our water resources. These studies and the associated research are chiefly those in which the skills and required knowledge are based on geology, chemistry, hydrology, engineering, and other physical science aspects of water management. Interior's water quality research extends beyond water supply to the study of environments adequate for the propagation, production and control of both fish and wildlife resources, and for water-based recreation.

In common with many others, the Department of the Interior has inerests and responsibilities in the economic and social aspects of water quality management. We recognize that such factors as quantitative requirements, competitive uses, and marketability of water and associated products must be given consideration in all plans. Interior takes account of the economic impact and other values that protection of water quality will have on the communities, the basin, the State and the Nation.

The Department is concerned with the conservation and development of commercial fishery resources in this area. Of major interest is the maintenance of a commercial shellfishery resource. All activity in this area is coordinated closely with the shellfish industry and the State of Maine. Any pollutant which impairs or downgrades the water quality of the area will have adverse effects on these activities and will be detrimental to the commercial fishery resources.

The Bureau of Commercial Fisheries of the Department of Interior agrees that substantial economic injury results from the inability to market shellfish or shellfish products because of pollution caused by sewage and industrial wastes discharge into the Penobscot River and the Upper Bay area.

We concur in the recommendations set forth on Page 9 of the Federal Water Pollution Control Administration Report. These recommendations would provide for achievement of water quality requirements which would allow the waters of the three segments to be used for the production and utilization of commercial fishery resources.

We note that shellfish has a recreational aspect as well as a commercial one. The closure of practically the entire area because of polluted conditions prevents residents and vacationers from utilizing this resource by digging a mess of clams. One of the joys of visiting the shore has been eliminated.

In conclusion, I would like to say that we urge that steps be taken to eliminate from the Penobscot River and Penobscot Bay those domestic, agricultural and industrial pollutants which detract from the full public enjoyment of the aquatic resources of these areas.

Thank you.

MR. STEIN: Thank you, Mr. Abelson.

Are there any comments or questions?

(No response.)

MR. STEIN: If not, thank you very much.

MR. KLASHMAN: Mr. Richard E. Griffith, Regional Director of the Bureau of Sport Fisheries and Wildlife.

## STATEMENT OF RICHARD E. GRIFFITH, REGIONAL DIRECTOR, BUREAU OF SPORT FISHERIES AND WILDLIFE, DEPARTMENT OF THE INTERIOR

R. E. Griffith

MR. GRIFFITH: Mr. Chairman, Conferees, Ladies and Gentlemen:

I am Richard Griffith, Regional Director, Northeast Region of the Bureau of Sport Fisheries and Wildlife.

The Bureau of Sport Fisheries and Wildlife has a special interest in pollution abatement in the Penobscot, the second largest river in New England, for the Bureau and the State of Maine have undertaken a joint Atlantic Salmon Restoration Project on the Penobscot. This operation has been set up as a pilot project to develop measures for overcoming the many adverse factors affecting the salmon fishery. We are confident that measures developed here will help restore other rivers in Maine and New England. A considerable amount of funds has been allocated to this program and we expect more will be available.

The movement of fish in the river is obstructed not only by dams, but also by pollution. Pollution, therefore, is a serious obstacle which must be overcome before we can expect to restore runs of salmon or other anadromous fishes (for which there is a potential) such as the American shad, alewife, and striped bass.

This is our immediate interest in pollution abatement for the Penobscot River. Ranking high among our other interests is salvaging the shellfish resource, the specific topic for this meeting.

The history of pollution on the Penobscot dates back at least a hundred years, at which time Bangor was a major lumber-exporting city. During the 1860's and later, the river from Old Town to Bucksport received the burden of immense quantities of sawdust and trimmings from the mills. Later pulp mills were erected and their wastes were added to the river. Today the river carries great quantities of domestic and industrial wastes comprised of oils, toxic chemicals and suspended solids. This load of wastes makes an important segment of the river uninhabitable for many species of aquatic animals. The animals may be killed outright or they may be unable to enter or pass through the polluted areas because of the low oxygen content of the water. Investigations by the Maine Water Improvement Commission on the mainstem of the Penobscot River verified the existence of an estuarial oxygen block during the summer. This block moves back and forth with the tide. When this occurs early in August, it shuts off the highly prized striped bass fishing.

The Penobscot River Valley is one of high esthetic value and until its waters became a receptacle for sewage and industrial wastes, the river itself was held in high esteem by fishermen and others who enjoyed a beautiful river. But today's Penobscot, with discolored waters and carrying scum and exhaling offensive odors, repels sportsmen and other recreationists. Few fishermen will wet a line in such waters and fewer still will eat fish taken from these waters. Downstream from Bangor, the Penobscot is so severely polluted that boats cannot be kept in the river because of the way the river fouls the paint. This further reduces fishing opportunities.

There are a number of good duck marshes in the Penobscot River Basin which attract waterfowl during migration and afford some nesting habitat. The ringneck, black and wood ducks are the principal species that nest in the basin. The lower Penobscot River and upper estuary is one of the three major waterfowl wintering areas in Maine. Species wintering here include the black duck, scaup, and goldeneye. Further out in the bay are found eiders, scoters and old squaws. While waterfowl are less frequently affected by river pollution than are fishes, they cannot tolerate certain pollutants, particularly oil and certain toxic chemicals that enter marshes under flood conditions and invade estuaries even under normal conditions. Oil on the plumage frequently kills considerable numbers of birds. Since an important part of a duck's diet consists of aquatic plants and animals, river pollutants that enter bays or river backwaters frequently destroy duck food. A few years ago, there was an outbreak of fowl cholera in the wintering duck population. This infection is believed to have come from domestic poultry and carried down the Penobscot to wild ducks.

The upper Penobscot Bay area supports a large clam resource which, before it was closed because of pollution, contributed significantly to the economy of the communities. With adequate control of pollution, this multi-million-dollar annual resource will be restored.

The Bureau of Sport Fisheries and Wildlife fully endorses the water quality standards recommended by the Federal Water Pollution Control Administration in its February 1967 report on the Penobscot River and upper Penobscot Bay.

Adequate pollution control on this river and in the bay as recommended by the Federal Water Pollution Control Administration is a necessary step toward the restoration of anadromous fish runs and the realization of benefits from resident fish, shellfish, aquatic wildlife, and the esthetic values of the region.

Thank you.

MR. STEIN: Thank you, Mr. Griffith.

Are there any comments or questions?

(No response.)

MR. STEIN: Mr. Griffith, do you think that if the pollution is abated and the standards that you talk about of the water quality are met, it would be possible to restore salmon runs to the Penobscot?

MR. GRIFFITH: We have every confidence that that can be accomplished, and it is believed that this will be accomplished in the foreseeable future.

We have already undertaken a program aimed at total restoration, this in cooperation with State agencies. As I mentioned in my statement, funds have been allocated for the restoration of the salmon resource.

Fishways that are essential to permit passage over the dams are scheduled for construction in 1967. Additional fishways will be built in subsequent years, and the total program for the restoration of the salmon will enhance the recreational uses of the river. It will permit a full realization of the recreational potential.

However, in addition, and very importantly, it will contribute to restoration of some of the Penobscot resources within the bay for shellfish.

MR. STEIN: You know, I was struck by that this morning.

Among the experts we have here is Mr. Earl Kari, who has been working on shellfish in the Pacific Northwest.

When we were eating breakfast this morning, we both looked out and this reminded us very much of the State of Washington, where he comes from. As a matter of fact, I met Earl on a charter boat going out for salmon years ago.

However, what I was struck by was this: You have the facilities in the area, the roads, the restaurants, the motels. I have been up here year after year. You have a really short season. That is, it runs, by and large, from the 4th of July to Labor Day, and that is it.

If you had the fish that Mr. Griffith talks about and if you had the activities that Earl and I know so well, with practically your capital investment here that you already have in your motels and restaurants, you can extend that season.

Certainly, as a Government man, as you people know, I am not very rich, but I have estimated that just on services and boats and things of that sort would bring between \$30 and \$50 a day for salmon fishing. I think it is well worth it. However, the only time I can do that is when I am lucky enough to get to the West Coast.

Imagine, given the population we have on the East Coast between Boston and Richmond, how many people would avail themselves of doing this here. It seems to me that we have a potential, if this is so, and this is what we are hearing now, that if this is so, I think you have the natural resources, you have a large portion of your capital investment, and all that is called for is to clean up the waters. The economic impact of this on this area can be tremendous.

MR. GRIFFITH: If I can make a further comment, Mr. Chairman?

MR. STEIN: Surely.

MR. GRIFFITH: We all know that as Maine goes, so goes the Nation.

I have lived on the West Coast and had the opportunity of enjoying salmon fishing out there. I couldn't agree more with the Chairman when he says that this is a terrific potential for economic growth.

I sincerely believe that the Penobscot can be restored so that it will become one of the most important fishery waters in the United States, but, additionally, the State governments elsewhere in New England are looking for a program on the Penobscot as something which can guide them in a similar program of restoration in other waters, which in the past, as certainly indicated in history, contributed to enormous yields of salmon. We think that a part of this can be recaptured through the program that we are talking about here.

Thank you.

MR. STEIN: Thank you.

MR. KLASHMAN: Thank you very much, Mr. Griffith.

We will next hear from Mr. John E. Bonkoski, who is the Area Coordinator for the Department of Housing and Urban Development.

## STATEMENT OF JOHN E. BONKOSKI, AREA COORDINATOR, DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT

MR. BONKOSKI: Mr. Chairman, Conferees, Ladies and Gentlemen:

My name is John E. Bonkoski, and I am the Area Coordinator for the Department of Housing and Urban Development.

First off, Mr. Chairman, our Department is extremely interested in anything that is done to control pollution and abatement of pollution of the Penobscot River.

By the way, we are no longer eligible to finance or participate in the development of community projects unless they take into consideration all aspects of stream control of pollution, sewage treatment plants, and facilities, and so forth. By the Housing Act of 1966, we can no longer participate in financing the sewage treatment plant construction, sewerage lines, collectors, etc., unless we have complete cooperation and authorization by the Department of the Interior, the Department of Health, Education, and Welfare and other Federal agencies that are involved in pollution control.

Therefore, this Department right now can only offer financial assistance if there is no effective measure in the area of pollution control, but we do stand ready now to help finance the study for sewage treatment facilities, advanced planning and loans for construction. We can offer up to 50 percent for construction costs for effective sewage control.

This Department has already made five advances to communities in this study. We still have funds left this year for planning and advances. We have funds for construction loans. Come the new fiscal year, July, we will have funds to continue on with our 50 percent water and sewer grants, and any communities that are interested can write to our Department in New York, outline their problem and we will set up for you a specific detailed study of just what Federal program of aid that we administer can be effective and helpful to you to adhere to the recommendations of this report.

Again, I wish to stress that all the work that we do is done in conjunction with other Federal Departments. We do not operate independently. Our funds are limited and our funds are basically geared on a joint basis. They are approved by the Department of the Interior and the Department of Health, Education, and Welfare in the effect of pollution control.

I will be here for the rest of this morning and part of the afternoon for anyone who wants any further information that we can provide.

Thank you, Mr. Chairman.

MR. STEIN: Thank you.

Are there any questions or comments?

(No response.)

MR. STEIN: I would like to say that HUD has been a very closely cooperating Federal Department. We have worked with them for years, particularly with what they used to call their Community Services Division.

As you may know, one of the Assistant Secretaries who is very interested in HUD, Charles Haar, is a New Englander and a professor at the law school in Harvard, and is very interested in your problems and in pollution control problems.

With that combination and with the regional representation, I am sure you are going to have a very sympathetic group if you would just come to HUD with your problems. We will work very closely with them and with you in trying to help you get any assistance that will be available.

MR. BONKOSKI: May I add one more point, Mr. Chairman?

Senator Muskie of this State was the sponsor of the legislation that requires us to take effective measures to provide for anti-pollution in all our development projects.

I state it for the point that in the State of Maine, we have several cities now which are feeling the effects of this Act. After the initial blow, in a sense, when the communities realize they have to take these actions and measures and they receive Federal funds, they have been thankful. They have been helpful and have not regretted it one bit.

MR. KLASHMAN: Thank you very much.

Mr. Macdonald, do you plan to say anything at all about the aid that the State of Maine offers to communities?

MR. MACDONALD: I think that is very well known throughout the State, Lester.

MR. KLASHMAN: Just for the record, we would like to make it clear that there is a program which provides that communities may obtain 40 percent of the cost of a waste treatment plant from the Federal Government if the State puts up 30 percent, and the State of Maine does do that.

In addition, if these wastes that are discharged to a stream that hasn't standards -- with what is going on today we certainly assume that that is going to be true -- it is possible for the Federal Government to contribute 50 percent if the State puts up 25. In other words, under the current legislation, it is possible for a community to obtain somewhere between 75 and 80 percent help, and the community would then only put up 20 percent to build any waste treatment plant.

Again, this is legislation which your Senator Muskie has been very much interested in, and has been influential in getting passed.

MR. MAC DONALD: May I add one thing?

MR. KLASHMAN: Yes.

MR. MAC DONALD: With regard to State contributions, there is a revision now before the Legislature which would permit the State to contribute to other projects besides those sponsored Federally by Public Law 660. In other words, we could contribute with the FHA or any other agency where their aid was for sewage treatment plants, interceptors, pumping stations, and so forth. Previously, we have only been a party to the Public Law 660-A, but should this law become a reality, we will be able to contribute to the other Federal aids also as long as treatment is involved.

MR. KLASHMAN: Is the amount still 30 percent?

MR. MAC DONALD: The amount is still 30 percent.

MR. KLASHMAN: It is not reduced to 25?

MR. MAC DONALD: No.

MR. KLASHMAN: So a community can then get 80 percent and only have to put up 20 percent in order to move ahead?

MR. MAC DONALD: Yes, and there is the regional plan for 5 percent, Lester.

MR. KLASHMAN: It is also possible if the community is part of a regional plan which is approved by the Department of Housing and Urban Development, for the community to get an additional 5 percent.

The next speaker we will hear from is Mr. Charles Larson, who is the regional shellfish consultant for the United States Public Health Service, with offices in Boston, Massachusetts.

## STATEMENT OF CHARLES LARSON, REGIONAL SHELLFISH CONSULTANT, UNITED STATES PUBLIC HEALTH SERVICE, BOSTON, MASSACHUSETTS

MR. LARSON: Mr. Chairman, Conferees, Ladies and Gentlemen:

C. Larson

My name is Charles D. Larson. I am a registered professional Sanitary Engineer and Regional Shellfish Consultant, Water Supply and Sea Resources Program, Division of Urban and Industrial Health, Public Health Service, Boston, Massachusetts.

My statement of interest in this conference is made within the framework of the National Shellfish Sanitation Program -- a consumer protection-oriented program administered jointly by the States and the Public Health Service.

Historically, the Public Health Service has been active in the field of shellfish sanitation since 1925, when an outbreak of typhoid fever attributed to the consumption of raw oysters taken from polluted waters occurred. The State shellfish control agencies and the shellfih industry at that time requested the Public Health Service to aid them in developing a program of shellfish sanitation which would provide for consumer confidence in this important food item. Minimum standards were developed for adoption by all shellfish-producing States; and since that date, the standards have been revised and updated several times. The current edition of the National Shellfish Sanitation Program Manual of Operations, dated 1965, has three parts. Part I of the Manual provides in detail criteria for surveying and classifying shellfish waters. For example, surveys of shellfish growing areas must take into consideration the most unfavorable hydrographic and pollution conditions that may exist in the area surveyed. All of the shellfish waters in the State of Maine are being surveyed and classified in accordance with this Manual.

Areas may be classified as follows:

A. *Approved* - Shellfish may be taken from these areas for direct marketing.

B. *Conditionally Approved* - The suitability of some areas for harvesting shellfish for direct marketing is dependent upon the attainment of an established performance standard by sewage treatment works discharging effluent directly or indirectly to the area. In other cases, the sanitary quality of an area may be affected by seasonal population, or sporadic use of a dock or harbor facility.

C. *Restricted* or moderately polluted areas - where shellfish may be taken under close supervision or depuration or (purification) in a properly designed and operated plant.

D. *Closed or Prohibited -* This classification covers grossly polluted areas where shellfish cannot be taken for any purpose other than relaying under special written permit.

Returning to the Conditionally Approved Area classification, some further discussion is in order.

Any program of water quality improvement for the purpose of providing additional areas for the direct market harvesting of shellfish must take into consideration the National Shellfish Sanitation Program requirements for either an Approved or Conditionally Approved Area. The elimination of a pollution source from an area or one entering a tributary to an area is rather easy to evaluate in terms of both water quality improvement and its effect on the classification of a shellfish growing area. However, when the water quality control is to depend upon the design, construction and operation of a sewage treatment facility, discharging into the same general area or watershed, then the abatement program should be guided at all stages of planning by National Shellfish Sanitation Program recommendations. Not only is the building and placement of the sewage treatment facility involved, but also, of equal importance, is the design and construction of the associated sewage collection system.

We call your attention to these facts so that they may be given adequate consideration where the water quality improvement program is aimed at the eventual use of an area as a shellfish harvest area for direct marketing. The abatement program would have to be shown to provide an established degree of treatment at all times during which the related area is to be used for harvesting of a raw food resource. The fact that the treatment facility may provide better than the established degree of treatment most of the time is all to the good, but for a raw food resource the assured level which will be consistently met at all times during periods of shellfish harvesting is the critical consideration and the one that will determine the design needs, location, and the amount of any additional harvest area that might be made available in accordance with the National Shellfish Sanitation Program.

When considering this classification, it must be remembered that the potential transmission of pathogenic viruses and bacteria by shellfish poses a host of technical complications. On the basis of studies which have been made, we feel reasonably confident that the classification criteria for Approved areas afford a reasonable safety margin and that shellfish harvested from areas meeting this criteria will not be involved in transmission of infectious hepatitis. We also know that sewage treatment processes do reduce the number of virus particles, although this knowledge is to some extent countered by that which indicates that virus inactivation by chlorine is hindered by the presence of large quantities of organic matter. (1, 2)

[1. Kelly, S. and Sanderson, W. W., The Effect of Chlorine in Water on Enteric Viruses, American Journal of

Public Health 48 (1958), 1323.

2. Clarke, N. A., and Chang, S. L., Enteric Viruses in Water, Journal of the American Water Works Association, 59 (October, 1959) 1299-1317.]

The Public Health Service is vitally interested in seeing that more of our shellfish waters meet the criteria for the growing and harvesting of shellfish for human consumption. In this connection, we are glad to support any recommendations of the Federal Water Pollution Control Administration that will upgrade the water quality of Penobscot Bay and especially those recommendations which would allow the opening of shellfish growing waters. The shellfish resource study which was carried out by the agencies cooperating in the pollution study of the Penobscot River and upper Penobscot Bay revealed that shellfish, particularly soft-shell clams, exist in commercial quantities which could be an asset to the economy of the State of Maine. It would be possible for a large portion of the shellfish to be harvested if adequate provision is made for the treatment of sewage and industrial waste now discharged to the waters of this area.

At this time I would like to submit into the record the Public Health Service Survey Report.

MR. STEIN: Without objection, that will be done.

MR. LARSON: Thank you.

(The Public Health Survey Report is as follows:

# SURVEY

# SHELLFISH GROWING WATERS OF THE PENOBSCOT RIVER AND UPPER PENOBSCOT BAY IN MAINE

1966

REGION I
&
NORTHEAST SHELLFISH SANITATION RESEARCH CENTER

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
PUBLIC HEALTH SERVICE

## INTRODUCTION

The national cooperative program for the certification of interstate shellfish shippers has been in operation for forty years. During this period, shellfish growing waters in all shellfish producing States have been surveyed and classified as to their suitability and safety for the growing and harvesting of shellfish, oysters, clams, and mussels. The current regulations covering the conducting of sanitary and bacteriological surveys of shellfish waters are outlined in detail in Part I of the National Shellfish Sanitation Program Manual of Operations. Based on the requirements of Part I of the Shellfish Manual and with the Maine Shellfish Regulations, the State Shellfish Control Agency established restricted or closed areas for the harvesting of shellfish prior to 1966 at Belfast, Closed Area #32; Searsport, Closed Area #33; Sears Island, Closed Area #33-A; Cape Jellison-Stockton Springs, Closed Area #34; and Penobscot River, Closed Area #35.

On June 28, 1966, the Maine Department of Sea and Shore Fisheries extended the closures in the Belfast - Searsport - Sears Island - Stockton Springs areas following a re-check of pollution sources, together with bacteriological sampling of the waters in the area. The revised shellfish closure, Closed Area #33, effective July 1, 1966, reads as follows:

"Because of pollution it shall be unlawful

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to dig or take in any manner any clams, quahogs, oysters, mussels and other marine mollusks from all shores, flats and waters of that portion of Penobscot Bay, Searsport and Stockton Springs, including Sears Island and Cape Jellison, Waldo County, between a red painted wood post located approximately 500 yards southwesterly of the old Steamboat Wharf, Searsport, and a red painted wood post located on the western shore of the Penobscot River at Fort Point, Stockton Springs."

On June 24, 1966, Mr. Dana Wallace of Commissioner Ronald W. Green's office, Maine Department of Sea and Shore Fisheries, telephoned Mr. Eugene T. Jensen, Chief of the Shellfish Sanitation Branch, Public Health Service, and informed him of the extended closure due to sewage pollution and untreated waste from poultry processing plants in the Belfast area. Mr. Wallace requested advice as to how this pollution problem should be brought to the attention of the Federal Water Pollution Control Administration. This matter was discussed with Mr. Murray Stein, Assistant Commissioner (Enforcement), FWPCA, and it was decided that the Public Health Service and the FWPCA would cooperate in conducting a joint investigation of the pollution problem in the Belfast -

Penobscot River area. Mr. Jensen and Mr. C. B. Kelly, Chief, Shellfish Research, Shellfish Sanitation Branch of the Public Health Service, contacted the Regional Office and the Northeast Shellfish Research Sanitation Center concerning the setting up of a cooperative field study. Mr. Jensen stated that he had informed the FWPCA that the Regional Program Director would serve as the coordinator for the joint study.

## Plan of Operation

Plans were developed for Marine Biologist Robert Campbell of the N. E. Shellfish Research Center to conduct a shellfish resource survey in the area with the assistance of the Maine Department of Sea and Shore Fisheries. It was agreed that the Regional Shellfish Sanitation Consultant, Mr. Charles D. Larson, would cooperate with Mr. Herbert Pahren, Project Director for the Merrimack River Project, FWPCA, in checking the sources of pollution, and assist in the collection of bacteriological samples of growing waters. Mr. Larson would also establish sampling points and collect samples of shellfish in the area to be covered by the investigation.

The NESSRC was requested to supply a fully equipped trailer laboratory; water sampling equipped boat, with motors; and bacteriological sampling equipment. The Center would also provide a boat operator, who would assist with the collection of samples. The laboratory personnel for operating the trailer laboratory would be supplied by the FWPCA, with representation from both the Merrimack River Project and the Robert A. Taft Sanitary Engineering Center.

## Field Service Activity

Mr. Myron Knudson, Chief of the field party for the Merrimack River Project, FWPCA, and his group, carried out field operations in connection with the checking of sources of pollution and collecting and analyzing water samples throughout the area during the period July 21 through August 19, 1966. The Regional Shellfish Consultant, Mr. Charles D. Larson, Region I, Public Health Service, participated in this field work during the period August 1 - 12, 1966. All parties and cooperating groups worked jointly and effectively in carrying out the field service activity.

The results of the field work carried out by Marine Biologist Robert Campbell and his field party during the period August 1 - 19, 1966, are outlined in the section of the report entitled "Resource Survey." The data collected by Mr. Larson in connection with the sources of pollution and shellfish samples are included in the report prepared by Mr. Herbert Pahren, Director, Merrimack River Project, since this was a cooperative activity and the laboratory work was performed by the laboratory technicians under his supervision.

## RESOURCE SURVEY
## SOFT-SHELL CLAM, MYA ARENARIA,
## PENOBSCOT BAY AREA
## AUGUST 1-19, 1966

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The area covered by this survey includes the rivers and estuaries in the Belfast-Searsport area. The fresh waters of the Penobscot and Passagassawakeag Rivers and other fresh water tributary streams in the area discharge into the saline waters of Belfast and Penobscot Bays. Seven towns border the Belfast-Penobscot Bay area, as shown by Figure 1-2. The towns of Northport, Belfast, Searsport and Stockton Springs are located in Waldo County and the towns of Penobscot and Castine are situated in Hancock County. The Town of Islesboro is an island located in the southwest section of Penobscot Bay.

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This report covers the results of a Shellfish Research Survey conducted under the direction of Marine Biologist Robert Campbell, Northeast Shellfish Sanitation Research Center, who was assisted by the following staff:

Maine Department of Sea and Shore Fisheries:

Paul Veno, Regional Biologist

Clam Sample Diggers, obtained and paid by the Department of Sea and Shore Fisheries

Federal Water Pollution Control Administration:

Merrimack River Project, Watertown, Massachusetts

Mr. Warren Oldaker, Chief, Laboratory Services Section

## Methods

The type of equipment and methods employed in harvesting soft-shell clams in the State of Maine has changed very little since the time of the early settlers. The area available for harvesting soft-shell clams has not changed. The mud flats or intertidal zone provides the area of shellfish harvest. Soft-shell clams, however, do inhabit some of the river and estuary bottoms below the extreme low water level, but due to mechanical equipment restrictions, imposed by State law, they are unavailable to the commercial market.

Resource assays within this study area are therefore confined to tidal areas available to both the commercial and sports digger and were conducted using a similar type of "hoe" or clam rake used by them.

The method chosen to conduct the survey was a variation of the "compass and chain" method described by Dow (1965). As the name implies, these instruments are used to control direction and distance of sampling plots in an area. Since the factors of time and personnel were limited for completing the survey, pacing the distance between sample plots and control points was taken in place of a surveyor's chain. As Dow states, "pacing will reduce the time and costs of a survey over chained measurements and will not seriously affect the accuracy of the final results on a large area."

The distance between sample plots during this survey depended upon the type of terrain encountered. In fairly defined coves and areas of high production, sample plots were taken on grids of 100'. On narrow intertidal zones where one or two samples in parallel could be taken within the zone, pacing was increased from 100' to 400'.

Samples of soft-shell clams were taken at each station from a plot two feet square. All clams removed from this limited area were measured and their numbers recorded on a log sheet. Although all sizes of clams were collected, only those above 1-1/4 inches were considered in calculating results. The survey was conducted during the period July 17 through August 11, 1966. Estimates of this soft-shell clam resource were acquired by sampling 2,035 stations in 997 acres.

Results of the resource survey are reported on a town-by-town basis and contain an estimate of the standing crop of soft-shell clams found within the boundaries of each town. In addition, calculations were made on the potential harvest of this 1966 crop if the presently restricted areas were opened to commercial digging.

Prediction of yield beyond the second year of harvest was not attempted and was considered impractical without the knowledge provided by subsequent surveys. Yield during a second year of harvest (1967) was calculated from an estimated growth rate of 1/2 inch in the size range of 1-1/4" to 1-3/4" size group. Accordingly, there would be no recruitment into the 1-3/4" group from the previous season's 1" class. Sizes within the 2" and 3" group were assumed to grow a minimum of 1/4 inches during a growing season, which is somewhat less than usual. Projected estimates of recruitment from these sizes consequently may be considered low or minimum estimates.

The reduction in the second year's standing crop in some cases is half or less than the previous year. This should not, as it appears, give a false impression that a stock is approaching a state of depletion -- the decrease is accounted for by the potential cropping off of about 70% of the marketable soft-clams accompanied by an estimated 50% mortality resulting from digging and natural causes. The individual flats should then, with normal digging pressure, reach an equilibrium between recruitment and natural mortality. Percentages of natural and digging mortality were applied from reports from Glude (1954) and Dow, Wallace, and Taxiarchis, and when combined averaged 50% per harvest season. Using these factors of recruitment and mortality, estimates were made on the second season's standing crop and the potential value to the fishermen and the community.

## Summary

The results of the soft-shell clam resource surveyed is summarized here on a town basis and includes a description of the area sampled, estimates of standing crop and potential value of this resource to the community. Projected standing crops and community values are summarized in Table I.

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The community value was calculated on a worth of two and one-half times the amount paid to a fisherman. A bushel of soft-shell clams, therefore, worth $7.77 to a digger would have a consequent value to the community of $19.43. Wallace (1966) explains how these figures were arrived at -- "It is difficult to get a precise accounting of the production of clams in the area because of the many ways in which they are sold locally and the numerous outlets. They are sold to intrastate dealers who operate small shucking houses. to direct customers from roadside 'clam stands,' peddled house to house, as well as to the one local interstate shellfish dealer. Because of these local markets in an active tourist area and family incomes from processing, the 'value added' to the incomes of the producers is considerable. For example, a bushel of clams dug and shucked locally and sold to a restaurant or fried clam stand, and then sold to the consumer, has a consumer value of approximately $50.

"In 1965 there were 32 full-time diggers in the two towns (Stockton Springs - Searsport), digging year-round, and producing 19,200 bushels of clams, with an average value of $7.77 per bushel, or a total income to the diggers of $149,184.

"From our data, it appears that it is reasonable to consider that the resource value to the community is worth two and one-half times the amounts paid to the digger, or $372,960."

## TOWN OF NORTHPORT

### Saturday Cove (A - B)

This cove is relatively small and at mean low water meter readings indicate an acreage of 6.7 acres. Soft-shell clam producing areas total approximately 5 acres. Twenty-two samples were obtained from this cove and calculations indicate a potential commercial standing crop of 1,108 bushels with a community value of $21,528. Figure 2-S, Tables I and II.

### Temple Heights - Bayside (B - C)

The surveyed shoreline between Saturday Cove (B) and Browns Head (C) is composed of a rather narrow intertidal zone strewn with cobbles and rock outcrops. Occasional mussel beds are found throughout the area. Planimeter reading shows a potential clam area of 49.5 acres. Available clam producing areas are calculated to be in the vicinity of 44 acres. Eighty stations were sampled along this stretch and estimates of commercial sized clams totaled 6,424 bushels with a community value of $124,818. Figure 2-S, Tables I and II.

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## Little River (C - D)

The total area of Little River may be classified as a typical soft-shell clam producing area. The portion surveyed within the Town of Northport lies between Brown's Head (C) and the Belfast - Northport town line (D) originating at the entrance to Little River. The boundary line continues across the flat in an east-southeast direction. There are about 54 acres found within this clam producing area. During the survey, quantities of mussels and eel grass were encountered as well as rock outcrops which necessitated lowering the available acreage to 45. A total of 58 samples were collected on this flat and estimates indicated a standing population of 9,900 bushels with a community value of $192,357. Figure 2-S, Tables I and II.

## Conclusion

Results of this recent soft-shell clam resource survey in the Town of Northport show a total standing crop of 17,432 bushels of commercially available clams. This harvest would provide a value to the community of $338,704.

Harvest during the following season, however, would be less because of natural and digging mortalities and overall poor recruitment of small clams into the fishery. The estimated standing crop would be 8,443 bushels with a community value of $164,047 compared with the previous season's standing crop community value of $338,704. Table I.

## Town of Belfast

### Little River (D - E)

This portion of Little River is quite similar in condition as that encountered in the Town of Northport. There are considerably less clam producing areas available (19) and fewer patches of mussels and eel grass. A total of 11 samples were collected from this flat and estimates indicate a commercial standing crop of 1,995 bushels with a community value of $38,763. Figure 2-S, Tables I and II.

### Belfast, West Shore (E - F)

The area between Little River Cove (E) and the beginning of the industrial center in the City of Belfast (F) consists of a relatively narrow band of intertidal zone composed of 45 acres of clam producing flats. This total area was reduced to 41 acres to account for the numerous rock outcrops and general array of cobble size stones within the area. Thirty-three (33) samples were collected along this expanse and estimates indicate a commercial standing crop of 4,141 bushels with a community value of $80,460. Figure 2-S, Tables I and II.

## Belfast, North Shore (G-H)

The available soft-shell clam producing areas found along the North Shore of Belfast are very similar in character to those of the East Shore except for a few distinct areas of larger exposed flats -- one of which is found in the western extremes near the abandoned bridge (G) and the other close to the Belfast - Searsport town line (H).

From planimeter readings there are 74 acres of intertidal zone between the location points G-H. Of these only 52 acres can be considered as available for clam production. This reduction in available acreage may be accounted for by the abundance of scattered rocks and rock outcrops found along this stretch of beach. Between these acres there are usually spotty clam flats containing fair populations of clams. Estimates from 74 samples indicate a standing crop of 9,880 bushels of commercial clams valued from a community standpoint at $191,968. Figure 2-S, Tables I and II.

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## Conclusion

Results of this soft-shell clam resource survey in the Town of Belfast show a total standing crop of 16,016 bushels of commercially available clams with a value to the community of $311,191.

The second year of harvest on these same flats would be relatively less due to both the factors of mortality and recruitment into the fishery. Estimates of standing crop would be in the vicinity of 9,420 bushels of commercial sized clams valued from a community standpoint at $183,031. Figure 3-S, Tables I and II.

## Town of Searsport

### Searsport, South Shore (H - I)

This stretch of shoreline is characterized by a narrow band of intertidal flats extending for about a mile and a half in an easterly directly from the Belfast-Searsport town line. The total expanse of flats has been reduced because of terrain features from 22.5 acres to 14. Calculations made from 94 samples indicated a commercial standing crop of 845 bushels with a community value of $16,418.

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Figure 4-S, Tables I and II.

Searsport Harbor (I - J)

This harbor is relatively large and at mean low water planimeter readings indicate an intertidal zone of [illegible] acres. From this total, soft-shell clam producing areas were reduced to approximately 58 acres. Seventy-five samples were collected from this harbor and calculations indicate a potential commercial standing crop of 3,596 bushels having a value of $69,870 to the community.

Long Cove (K - L)

The intertidal zone of Long Cove beginning at the eastern edge of the industrial complex (K) expands in its northern section into a typical clam flat. Proceeding in a southerly direction the flat narrows at the northern tip of Sears Island and continues in a similar manner to point (L) on the western shore. Readings made from nautical charts show the intertidal zone within this area to be 158 acres. Available clam producing areas resulting from the survey indicate a potential clam producing area of 124 acres. One hundred and forty-seven (147) stations were sampled along this stretch of beach and cove and estimates of commercial sized clams totaled 8,804 bushels with a community value of $171,062. Figure 4-S, Tables I and II.

## Stockton Harbor (M - N)

The intertidal zone between control points (M) on Sears Island and (N) at the Searsport - Stockton Springs town line is distinguished by narrow bands interrupted by occasional coves. At the extreme northeast end (N) the tidal zone has a tendency to widen into a characteristic clam flat. Mechanical measurements on nautical charts give a total of 72 acres of intertidal zone. Available clam producing flats arrived at after deducting nonproducing areas from the total averaged about 57. Rocky outcrops, mussel beds, and a chemical dumping area in the southwest section accounted for this reduction. A standing crop of 7,467 bushels of soft-shell clams was estimated for this section from 242 stations in 57 acres. The potential value to the community is $145,083. Figure 4-S, Tables I and II.

## Conclusion

Resource estimates derived from this survey show that the Town of Searsport is endowed with a fair amount of clam producing areas stocked with abundant quantities of shellfish.

An immediate opening of this bed would greatly enhance the economy of the town. Estimates of the present value of this resource to the community are high and in the vicinity of $402,433. Table I. Estimates of the standing crop in the second year are 6,112 bushels of commercial sized clams having a value of $118,756.

## Town of Stockton Springs

### Stockton Harbor (N - O)

The portion of Stockton Harbor in the Town of Stockton Springs may be classified a typical clam flat in all respects. The intertidal zone is extensive and not unduly cluttered with rock outcrops or mussel beds. The total available intertidal area between the control points (N-O) has been mechanically estimated at 115 acres. Of this acreage, only four were deducted from the total because of rocky outcrops. Museel beds are in evidence in some places but most are located below the low tide mark. Shellfish samples at

327 stations place the standing crop of commercially available clams at 19,647 bushels. The resulting community value is estimated at $381,741. It appears that this cove is the most highly productive of all areas surveyed during the study. Figure 5-S, Tables I and II.

## Cape Jellison (P - Q)

The intertidal zone between control points (P - Q) provides a very limited area for clam production except the small extension at the southern tip of Cape Jellison. A sheer rock outcrop along the shore in one section of this coast is completely void of suitable clam producing bottom. Mechanical estimates of available intertidal zone within this area is placed at 33+ acres. Allowable deductions resulting from rock outcrops and scattered boulders reduces the total clam producing areas to 30 acres. Clam population appeared to be somewhat spotty throughout this area. Sixty-eight (68) samples were collected within this study area and calculations showed the commercial standing crop of clams to be 4,050 bushels with a value to the community of $78,692. Figure 5-S, Tables I and II.

## Fort Point Cove (R - S)

### C. Larson

The intertidal zone within this study area is rather extensive and results from a reasonably broad band along the northeast shore of Cape Jellison which expands into coves as it approaches Sandy Point (S). Mechanical estimates on the available tidal zone made from nautical charts gives a figure of 167 acres. The rocky outcrops between the several secondary coves reduces this total clam producing area to 123 acres. A standing crop estimate derived from 534 shellfish samples indicated that there are approximately 2,829 bushels of commercial sized clams populating the area with a community value of $54,967. Figure 5-S, Tables I and II.

## Conclusion

Results of this survey show that a population of 26,526 bushels of commercial size soft-shell clams inhabit the growing areas along the shoreline of Stockton Springs. This standing crop of shellfish would, on an overall basis, benefit the community by a sum of $515,400.

Projected figures for standing crop and value, providing the harvest was continued into a second year, show that the estimated potential clam population would be 11,082 bushels of marketable shellfish with a value to the community of $215,322. Table I.

## Town of Penobscot

### West Penobscot (Stations 1 - 35)

The intertidal zone between Stations 1 - 35 is a narrow band which was estimated at 30 acres. Allowances made due to the rocky features of the shoreline reduced this potential clam growing area to 27 acres. Twenty-three (23) shellfish samples were collected here and the total commercial population was estimated to be 810 bushels with a community value of $15,738.

### Morse Cove (Stations 36 - 43)

This portion of Morse Cove within the boundaries of Penobscot contains a very small intertidal zone totaling 8 acres. Of these 8 acres, one was deducted from the total because of the evenly distributed cobbles and stones along the upper intertidal zone leaving 7 acres of prospective clam growing flats. It was only necessary to collect 9 shellfish samples within this area because the clam populations were confined to the lower intertidal zone. Available commercial populations were estimated to be 623 bushels. Community value of this crop was estimated to be $12,105. Figure 6-S, Tables I and II.

## Conclusion

Results of this soft-shell clam survey indicate that this portion of Penobscot is relatively poor both in clam producing areas and existing clam populations. From a total estimated standing crop of 1,433 bushels of soft-shell clams, the estimated value to the community was $27,843.

Projected yields during the second year of harvest were also estimated to be poor. Benefits applied to the Town of Penobscot from this estimated standing crop of clams would be $18,244. Table I.

## Town of Castine

### Morse Cove (Stations 44 - 50)

This portion of Morse Cove was considered a mirror image of the half located in the Town of Penobscot. Consequently, the same estimates for standing crop and value are used. Figure 7-S, Tables I and II.

### Castine, West Shore (Stations 51 - 74)

This shoreline of Castine is typified by a narrow band of intertidal zone containing rock outcrops and scattered cobble sized stones. Mechanical made estimates of the existing intertidal zone derived from nautical charts totaled 28 acres. This figure was reduced to 24 acres of possible clam producing flats after deductions were made to account for rocky areas. Thirty-five (35) shellfish samples from these growing areas were collected which indicated a possible commercial population of 648 bushels with a value to the community of $12,591. Figure 7-S, Tables I and II.

### Castine, West Shore (Stations 75 - 126)

This section of shoreline in the Town of Castine is a continuation of the type encountered in the area covered by Stations 51 - 74. The intertidal zone again is a narrow band paralleling the shoreline. There were no apparent modifications noticed along this stretch of beach to distinguish it from any other covered in the immediate area. Calculations made from nautical charts by planimeter showed the intertidal zone to contain 35 acres. Deductions made for the rocky condition of the beach reduced the potential clam growing area to 30 acres. Sampling of the area was conducted on the 11th of August, when 60 samples were collected which indicated a commercial population of 2,190 bushels with a community value of $42,552. Figure 7-S, Tables I and II.

## Wadsworth Cove (Stations 127 - 177)

This cove was the last to be surveyed on the mainland. The resource survey was restricted to the cove proper since conditions of the outer fringes evidenced by high densities of cobble sized stones appeared unsuitable for clam production. Carpets of smaller stones also covered the upper portion of the intertidal zone throughout many sections of the beach.

Planimeter readings made from nautical charts showed an intertidal zone of 56 acres. This total acreage was reduced to 50 when adjustments were made to account for the rocky patches throughout the clam growing areas. This study was conducted on the 11th of August and the results obtained from soft-shell clam samples of 62 stations indicated a potential commercial population of 4,250 bushels with a community value of $82,578. Figure 7-S, Tables I and II.

## Conclusion

Of all the areas surveyed in the Town of Castine, it is apparent that Wadsworth Cove is the most productive and would aid more in boosting the economy of the community than all the other surveyed areas of the town combined.

Estimated results on a town basis show that the present standing crop of marketable soft-shell clams is 7,711 bushels with a community value of $149,825.

Projection of these estimates into a second year indicate a standing crop of commercial size clams to be 4,672 bushels with a potential community value of $90,777.

## Town of Islesboro

### Turtle Head Cove ($A_1$ - $B_1$)

Only the inner portion of this cove was subjected to a shellfish resource survey. The area covered was rather limited in scope and uniform in condition which did not necessitate an adjustment of acreage. The clam producing intertidal zone totaled 15 acres. The collection of 22 clam samples showed the potential standing crop of commercial sized clams to be 1,140 bushels with a value to the community of $22,150. Figure 8-S, Tables I and II.

### Coomb's Point ($C_1$ - $D_1$)

### C. Larson

The area of Coomb's Point surveyed for clam resources was very small. The amount of growing area available in this plot was 5 acres and since the flat was uniform in nature and lacked any rocky features, it was unnecessary to make any adjustment. The total area surveyed remained at 5 acres. Because this flat was of such a uniform condition and the shellfish were dispersed in an equally uniform manner, it was only necessary to collect 3 shellfish samples to arrive at a potential standing crop of 1,569 bushels. The potential community value from this area is $30,486. Figure 8-S, Tables I and II.

### Parker Cove ($E_1$ - $F_1$)

This cove is located on the east side of Islesboro Island and is separated from an adjoining cove by a small island connected to the main island by a narrow bar. The entire cove was not surveyed for shellfish due to time limitations and the general lack of shellfish on the flats northeast of the small island.

The intertidal zone of Parker Cove investigated during this survey consisted of 85.5 acres. Adjustments were necessary to this total because of the presence of large patches of eel grass and mussels. The actual number of acres available for clam production amounted to 73. Sixteen shellfish samples were collected over rather large intervals and the resulting estimated standing crop was 3,358 bushels of commercial size clams with a value to the community of $65,246.

### Coomb's Cove ($G_1$ - $H_1$)

This cove is located just south of Parker Cove on the east side of Islesboro Island and contains a great deal less available clams flats than its northern neighbor. Estimates of land area by planimeter show an intertidal zone of approximately 36 acres. No adjustments were deemed necessary in this area to account for the small amounts of mussels and eel grass. Thirty-two (32) shellfish samples were collected from this cove on the 9th of August and the resulting estimates indicated the potential standing crop of commercial size soft-shell clams to be a poor 648 bushels with a community value of $12,591. Figure 8-S, Tables I and II.

### Conclusion

The only apparent cove in the surveyed portion of Islesboro Island showing reasonable clam production is Parker

Cove. The remaining areas seem to possess a fluctuating type of production which appeared to be at a low point during this particular period.

The present standing crop of commercial sized clams for the town is 6,715 bushels with a community value of $130,472. The estimated marketable crop of clams for the following year would be 5,458 bushels with a community value of $106,050. Table I.

About 90 percent of the shore surrounding Penobscot Bay was surveyed for soft-shell clam resources. The areas not surveyed were either industrial complexes or very low estimated producing areas. The coves proved to be the most conclusive areas for clam production and the remaining shoreline contained clam populations interdispersed with scattered boulders and rock outcrops.

The most productive clam areas were Stockton Springs and Searsport, followed by Northport and Belfast. The remaining Towns of Penobscot, Castine and Islesboro were not completely surveyed, which accounts for this low total figure.

For the total area of Penobscot Bay affected by the recent shellfish area closures, the estimated population was placed at 96,545 bushels of marketable soft clams valued from a community standpoint at $1,875,868.

A potential standing crop estimated for the second year of harvest would be in the vicinity of 46,126 bushels of commercial size soft clams with a community value of $896,228.

## TABLE I

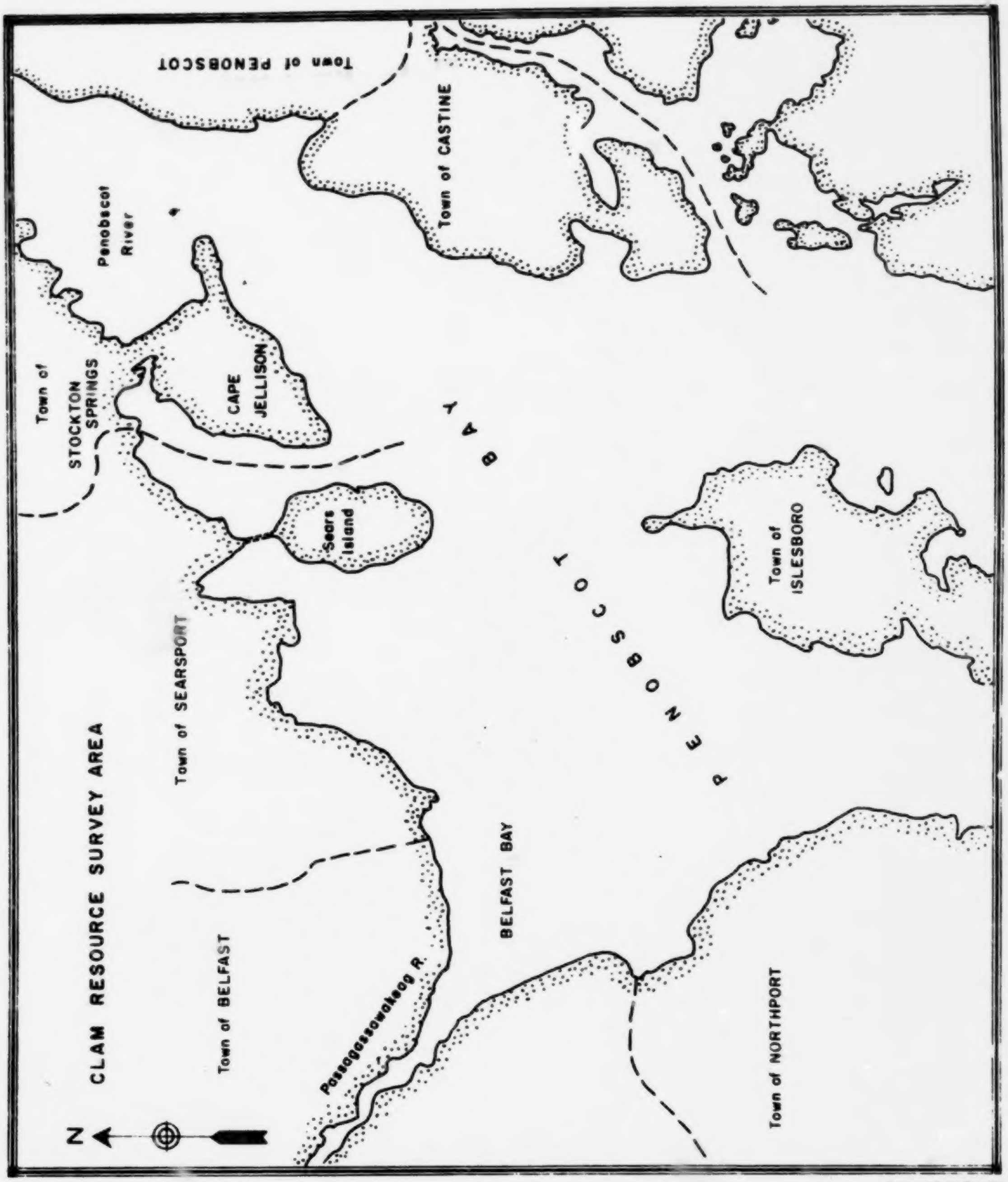
## Present and Projected Standing Crops and Their Values For Towns Surrounding Penobscot Bay, Maine

| Town | 1966 | | 1967 | |
|---|---|---|---|---|
| | Standing Crop | | Standing Crop | |
| | Bushels | Community Value | Bushels | Community Value |
| Northport | 17,432 | $338,703 | 8,443 | $164,047 |
| Belfast | 16,016 | $311,191 | 9,420 | $183,031 |
| Searsport | 20,712 | $402,433 | 6,112 | $118,756 |
| Stockton Springs | 26,526 | $515,400 | 11,082 | $215,322 |
| Penobscot | 1,433 | $ 27,843 | 939 | $ 18,244 |
| Castine | 7,711 | $149,826 | 4,672 | $ 90,777 |
| Islesboro | 6,715 | $130,472 | 5,458 | $106,050 |
| Total Penobscot Bay Area | 96,545 | $1,875,868 | 46,126 | $896,228 |

## TABLE II

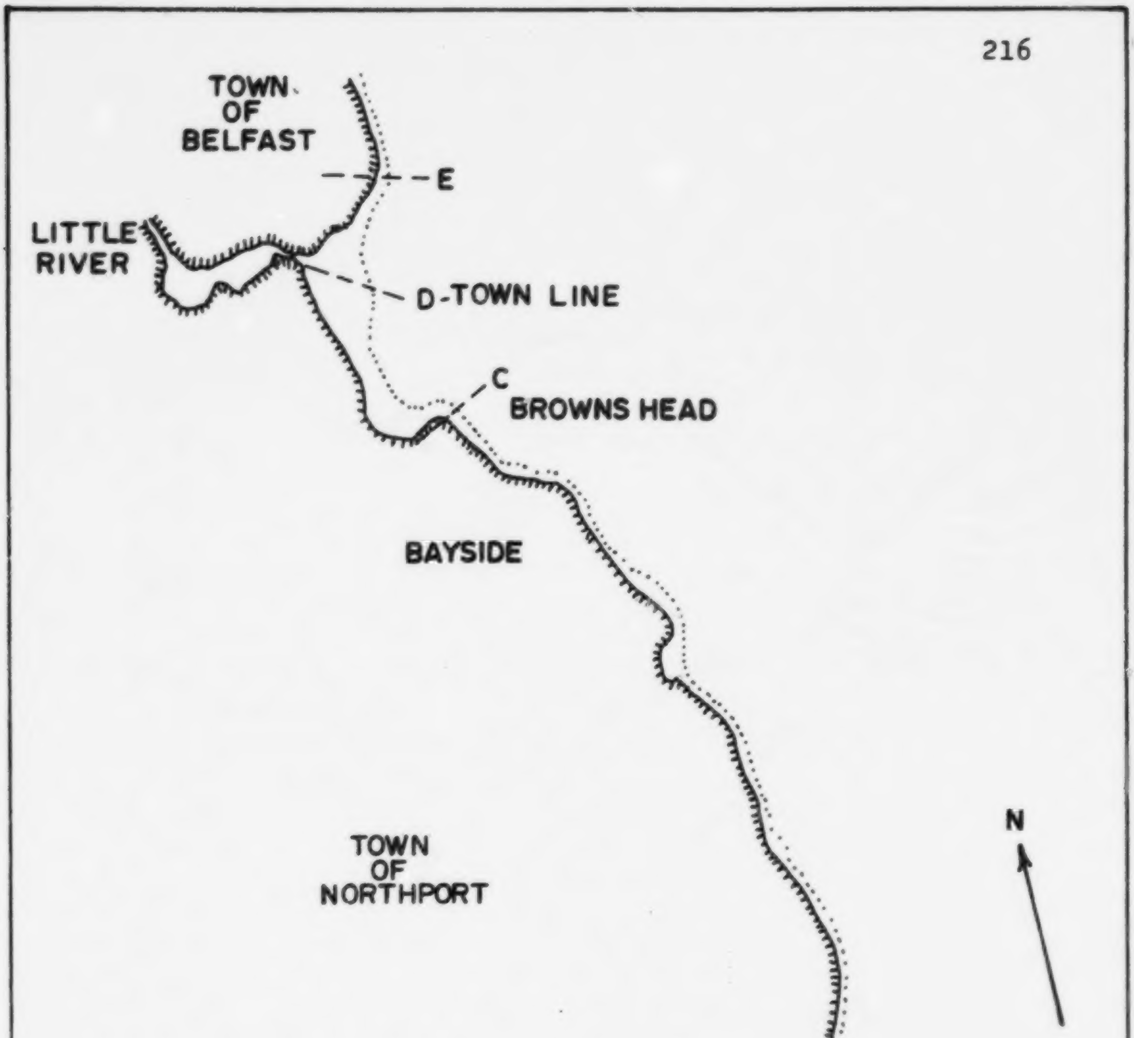
Pertinent Data Used to Estimate Standing Crop for Individual Areas

| Area | Town | Symbols | Date | # Stations | Acres | Estimated Bu./Acre | Standing (Bu./Acre) |
|---|---|---|---|---|---|---|---|
| Saturday Cove | Northport | A - B | 8-8-66 | 22 | 5 | 221.6 | 1,108 |
| Temple Heights | Northport | B - C | 8-8-66 | 80 | 44 | 146 | 6,424 |
| Little River | Northport | C - D | 8-5-66 | 58 | 45 | 220 | 9,900 |
| Little River | Belfast | D - E | 8-5-66 | 11 | 19 | 105 | 1,995 |
| West Shore | Belfast | E - F | 8-5-66 | 33 | 41 | 101 | 4,141 |
| North Shore | Belfast | G - H | 8-4-66 | 74 | 52 | 190 | 9,880 |
| South Shore | Searsport | H - I | 7-26-66 | 94 | 14 | 60 | 845 |
| Searsport Hb. | Searsport | I - J | 7-25-66 | 75 | 58 | 62 | 3,596 |
| Long Cove | Searsport | K - L | 7-22-66 | 147 | 124 | 71 | 8,804 |
| Stockton Hb. | Scarsport | M - N | 7-19,22-66 | 242 | 57 | 131 | 7,467 |
| Stockton Hb. | Stockton Sp. | N - O | 7-29-66<br>7-27-66<br>8-17-66 | 327 | 111 | 177 | 19,647 |
| Cape Jellison | Stockton Sp. | P - Q | 7-29-66 | 68 | 30 | 135 | 4,050 |
| Fort Pt. Cove | Stockton Sp. | R - S | 8-2,3-66 | 534 | 123 | 23 | 2,829 |
| W. Penobscot | Penobscot | 1 - 35 | 8-10-66 | 23 | 27 | 39 | 810 |
| Morse Cove | Penobscot | 36 - 43 | 8-10-66 | 9 | 7 | 89 | 623 |
| Morse Cove | Castine | 44 - 50 | 8-10-66 | 8 | 7 | 89 | 623 |
| West Shore | Castine | 51 - 74 | 8-10-66 | 35 | 24 | 27 | 648 |
| West Shore | Castine | 75 - 126 | 8-11-66 | 60 | 30 | 73 | 2,190 |
| Wadsworth Cove | Castine | 127 - 177 | 8-11-66 | 62 | 50 | 85 | 4,250 |
| Turtle Cove | Islesboro | $A_1$ - $B_1$ | 8-9-66 | 22 | 15 | 76 | 1,140 |
| Coomb's Pt. | Islesboro | $C_1$ - $D_1$ | 8-9-66 | 3 | 5 | 314 | 1,569 |
| Parker Cove | Islesboro | $E_1$ - $F_1$ | 8-9-66 | 16 | 73 | 46 | 3,358 |
| Coomb's Cove | Islesboro | $G_1$ - $H_1$ | 8-9-66 | 32 | 36 | 18 | 648 |


N
Town of PENOBSCOT
Town of CASTINE
Penobscot River
Town of STOCKTON SPRINGS
CAPE JELLISON
BAY
Sears Island
PENOBSCOT
Town of ISLESBORO
Town of SEARSPORT
Town of BELFAST
Passagassawakeag R.
BELFAST BAY
Town of NORTHPORT

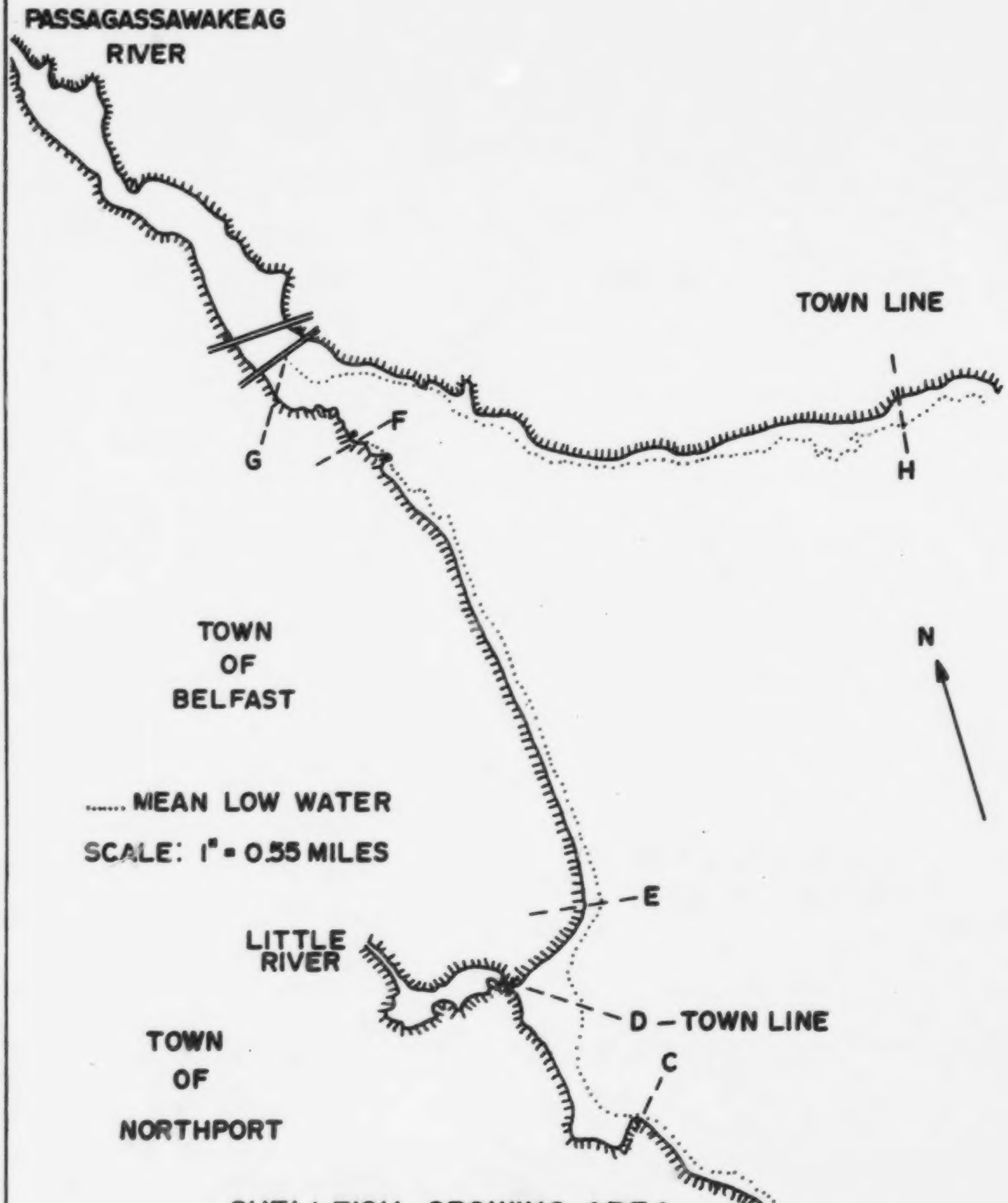
CLAM RESOURCE SURVEY AREA

FIGURE 1-S


TOWN OF BELFAST
E
LITTLE RIVER
D-TOWN LINE
C
BROWNS HEAD
BAYSIDE
TOWN OF NORTHPORT
N
..... MEAN LOW WATER
SCALE: 1" = .55 MILES
B
SATURDAY COVE
A

SHELLFISH GROWING AREA
TOWN OF NORTHPORT

FIGURE 2-S


PASSAGASSAWAKEAG RIVER
TOWN LINE
F
G
H
TOWN OF BELFAST
N
...... MEAN LOW WATER
SCALE: 1" = 0.55 MILES
E
LITTLE RIVER
D – TOWN LINE
C
TOWN OF NORTHPORT

SHELLFISH GROWING AREA
TOWN OF BELFAST

FIGURE 3-8

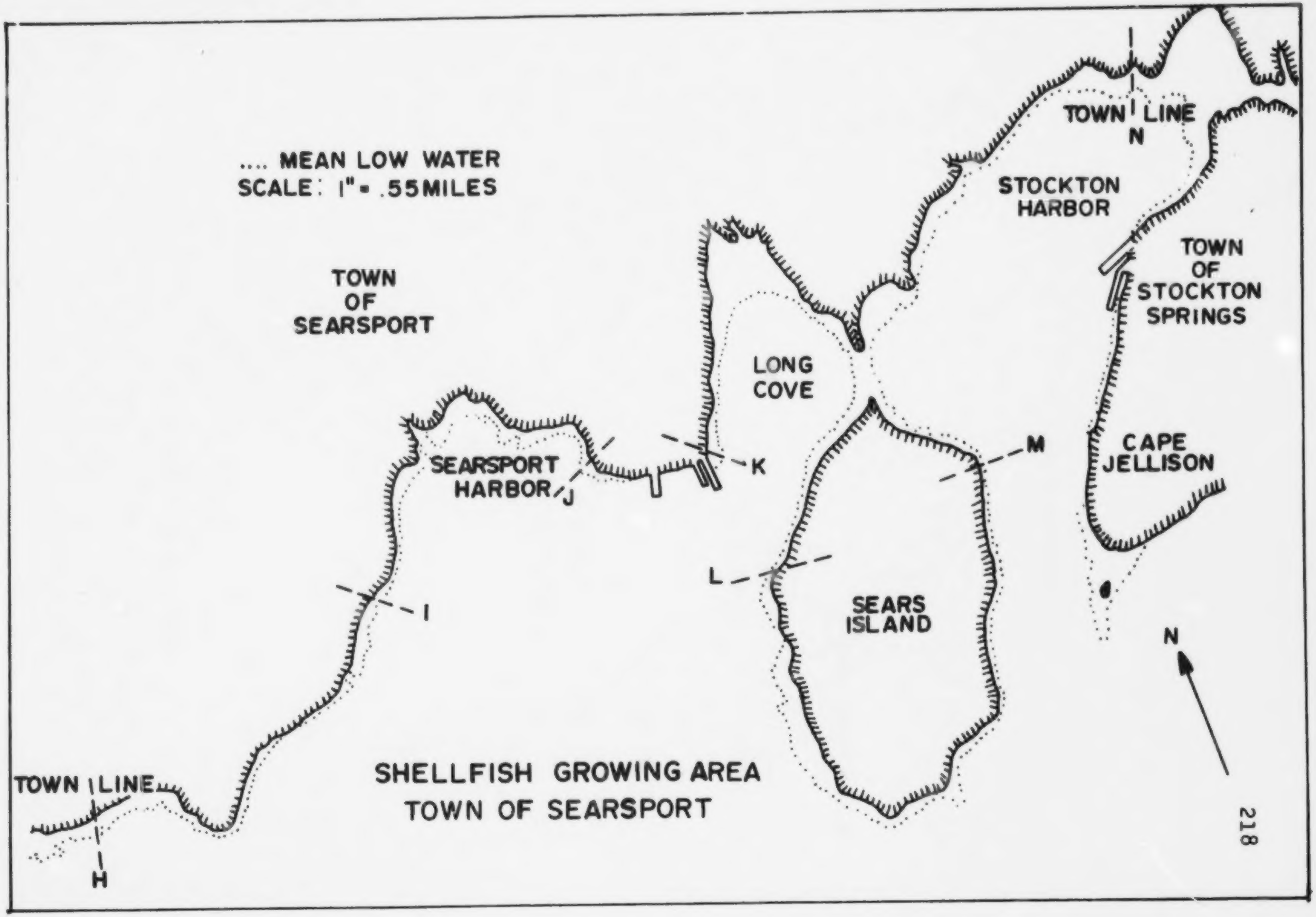
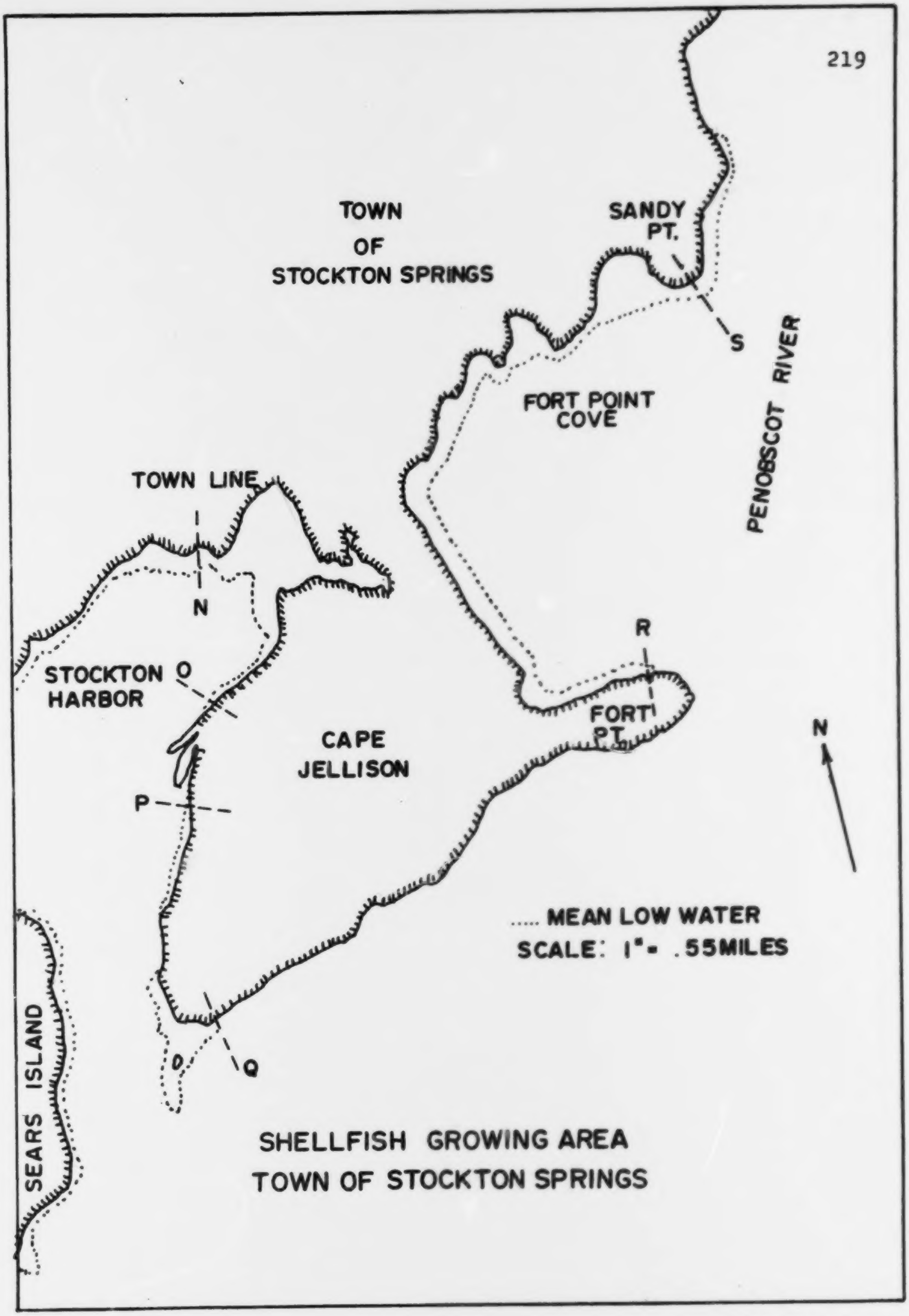
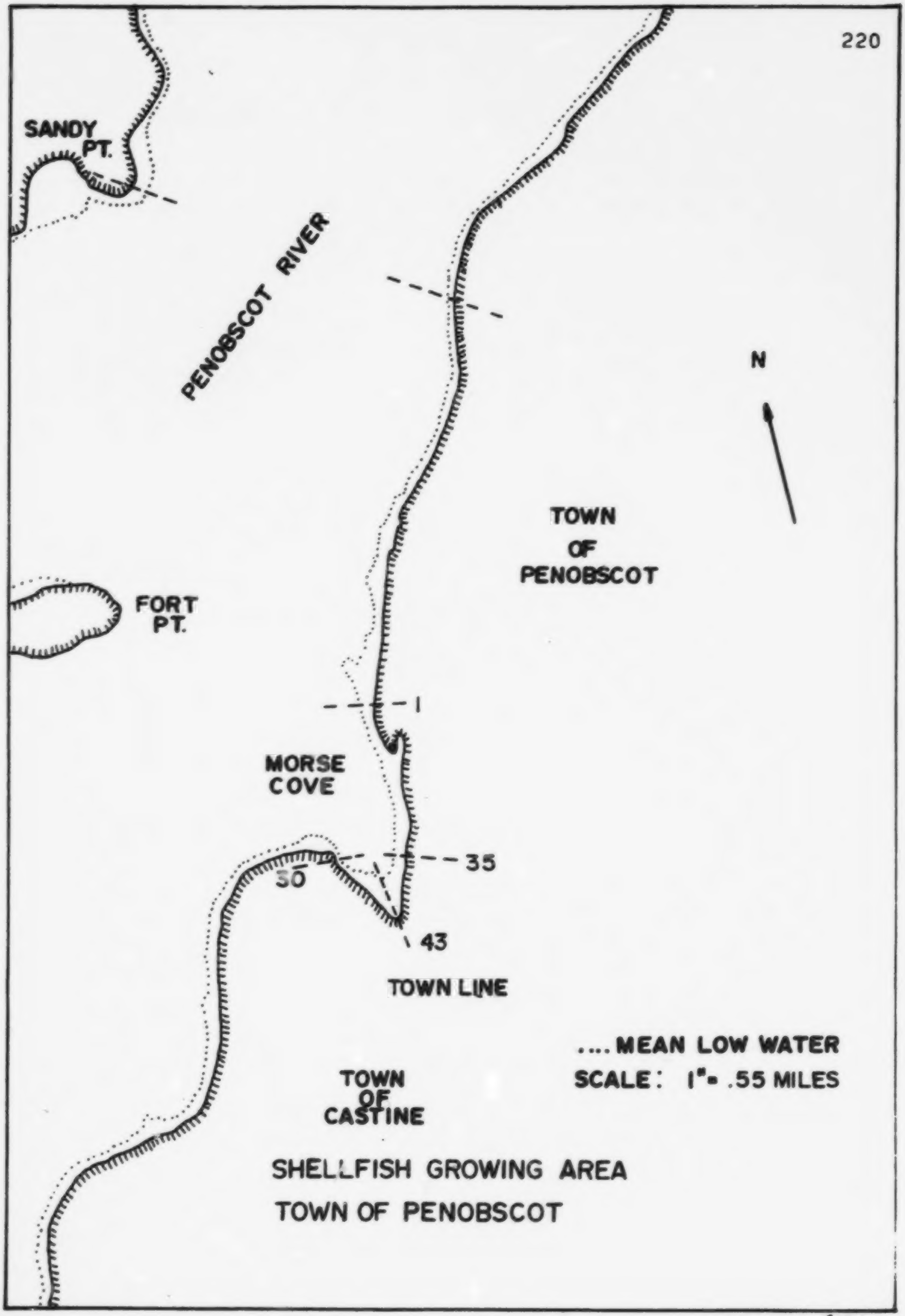

.... MEAN LOW WATER
SCALE: 1" = .55 MILES
TOWN OF SEARSPORT
TOWN LINE
N
STOCKTON HARBOR
TOWN OF STOCKTON SPRINGS
LONG COVE
CAPE JELLISON
SEARSPORT HARBOR
J
K
M
L
SEARS ISLAND
I
N
TOWN LINE
H
SHELLFISH GROWING AREA
TOWN OF SEARSPORT

FIGURE 4-8


TOWN
OF
STOCKTON SPRINGS
SANDY PT.
S
PENOBSCOT RIVER
FORT POINT COVE
TOWN LINE
N
R
STOCKTON HARBOR
O
FORT PT.
N
CAPE JELLISON
P
..... MEAN LOW WATER
SCALE: 1" = .55MILES
Q
SEARS ISLAND

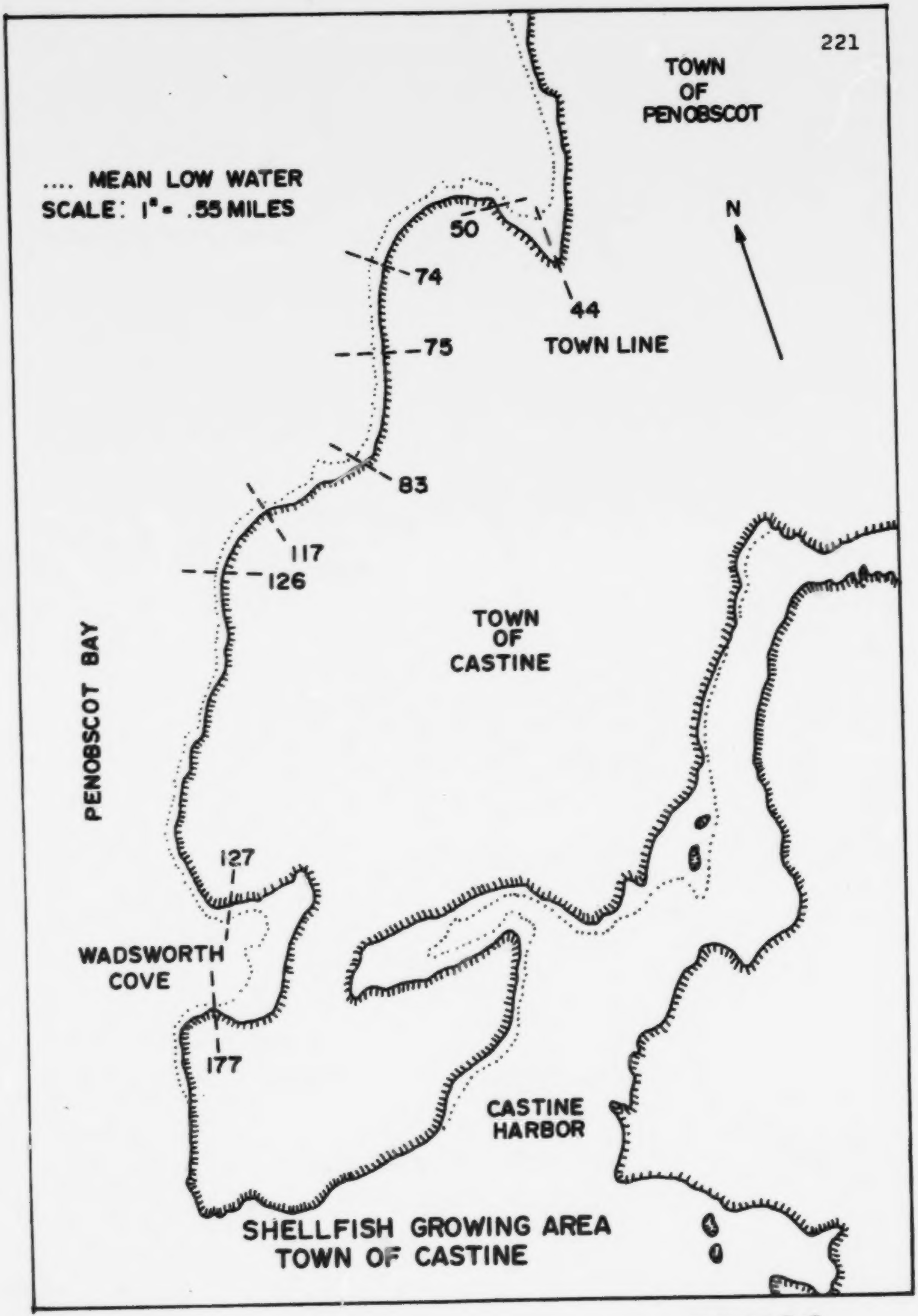
SHELLFISH GROWING AREA
TOWN OF STOCKTON SPRINGS

FIGURE 5-8


SANDY PT.
PENOBSCOT RIVER
N
TOWN OF PENOBSCOT
FORT PT.
1
MORSE COVE
35
30
43
TOWN LINE
TOWN OF CASTINE
.... MEAN LOW WATER
SCALE: 1" = .55 MILES

SHELLFISH GROWING AREA
TOWN OF PENOBSCOT

FIGURE 6-8


TOWN OF PENOBSCOT
.... MEAN LOW WATER
SCALE: 1" = .55 MILES
N
50
74
44
75
TOWN LINE
83
117
126
TOWN OF CASTINE
PENOBSCOT BAY
127
WADSWORTH COVE
177
CASTINE HARBOR

SHELLFISH GROWING AREA
TOWN OF CASTINE

FIGURE T-8

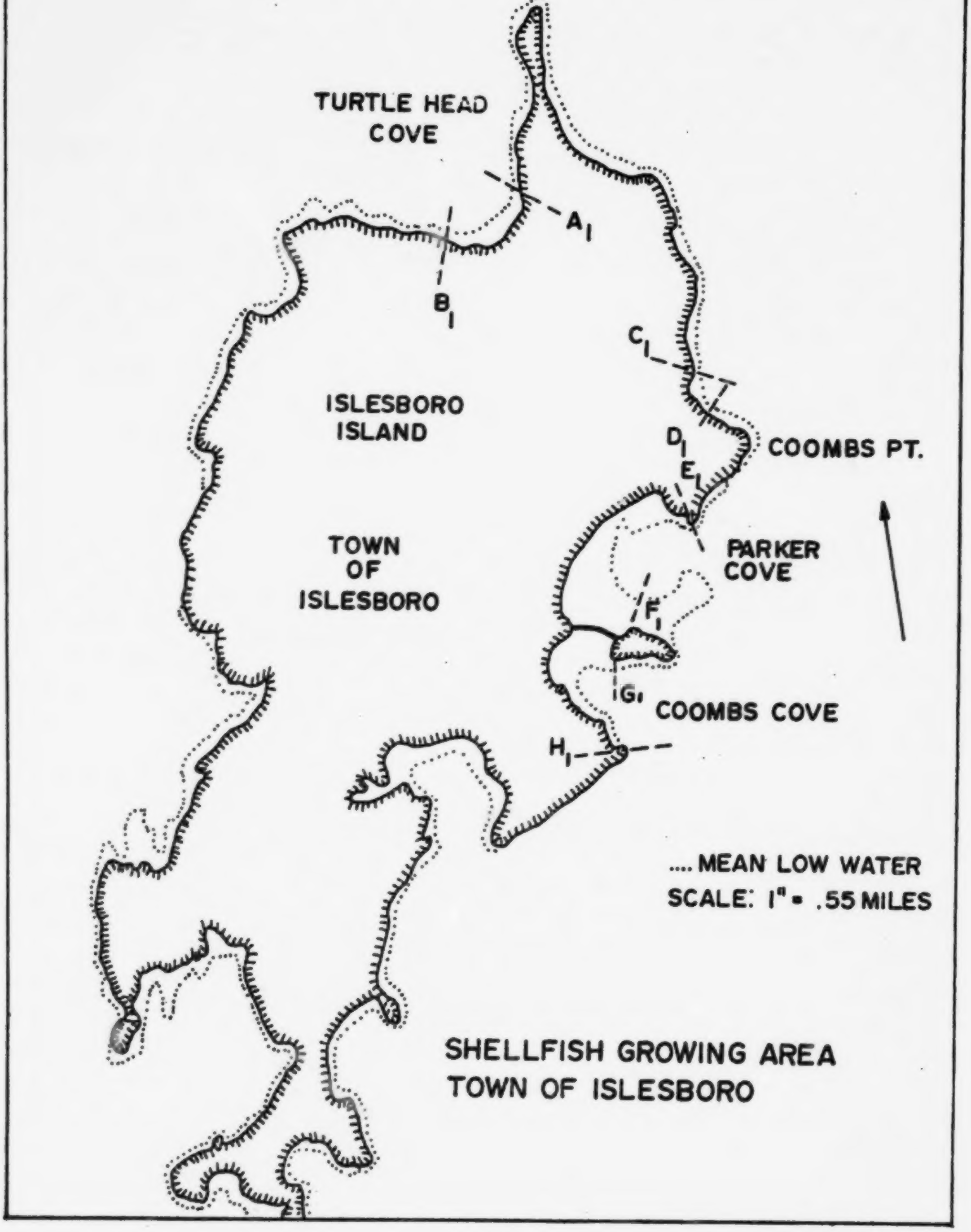

TURTLE HEAD COVE
$A_1$
$B_1$
$C_1$
ISLESBORO ISLAND
$D_1$
$E_1$
COOMBS PT.
TOWN OF ISLESBORO
PARKER COVE
$F_1$
$G_1$
COOMBS COVE
$H_1$
.... MEAN LOW WATER
SCALE: 1" = .55 MILES
SHELLFISH GROWING AREA
TOWN OF ISLESBORO

FIGURE 8-8

## References

Dow, Robert L. Reprint 1965. Shellfish Survey Methods. Technical Bulletin No. 1. Department of Sea and Shore Fisheries, State House, Augusta, Maine.

Dow, Robert L., D. E. Wallace and L. N. Taxiarchis. 1954. Clam (Mya arenaria) Breakage in Maine. Research Bulletin No. 15. Department of Sea and Shore Fisheries, State House, Augusta, Maine.

Glude, John B. 1954. Survival of Soft-Shell Clams, Mya arenaria, Buried at Various Depths. Research Bulletin No. 22. Department of Sea and Shore Fisheries, State House, Augusta, Maine.

Wallace, D. E. 1966. Personal Correspondence. State of Maine, Department of Sea and Shore Fisheries.)

MR. STEIN: Does that complete your statement? Are there any questions or comments?

(No response.)

MR. STEIN: If not, thank you, Mr. Larson.

MR. KLASHMAN: Thank you very much, Mr. Larson.

Captain Hagadorn, did you wish to make any statement for the Coast Guard?

CAPTAIN HAGADORN: No, sir.

MR. KLASHMAN: There is somebody representing the

United States Air Force here. Do they care to make a statement?

(No response.)

MR. KLASHMAN: Are there any other Federal agencies here?

(No response.)

MR. KLASHMAN: If not, this completes the presentation by the Federal agencies.

MR. STEIN: Thank you, Mr. Klashman.

At this point, we will call on the representatives of the various interest groups and individuals who indicated they wanted to make statements. I will try to get as many as we can on before 12:00 o'clock. At that time we will recess for lunch until 1:30, after which we will reconvene. Unless some of these statements are longer than I anticipate, I am hopeful that we will be able to complete the conference today.

However, let me say this: the conferees and the rest of our staff are here to get the job done. I want no one to feel that he needs rush, because we are going to stay here until we complete this in an orderly manner and everyone has had his say. I don't think we can come to judgments or conclusions unless we do that, and that is why we are here.

With that, we would like to call on the

representative of Commissioner Ronald W. Green, Department of Sea and Shore Fisheries, Mr. Robert L. Dow.

## STATEMENT OF ROBERT L. DOW, RESEARCH DIRECTOR, DEPARTMENT OF SEA AND SHORE FISHERIES OF THE STATE OF MAINE

MR. DOW: Mr. Chairman, Conferees, Ladies and Gentlemen:

I am Robert Dow. I am Research Director for the Department of Sea and Shore Fisheries.

I have the dubious distinction, I presume, of being, in terms of direct concern with this area, for the number of years, the oldest bureaucrat, Federal or State, because I was involved in the original closure of the area here at Belfast Bay in 1946.

I am not going to attempt to compete with the documents to which you have already been exposed. I would like to cite a few historical developments and also add some words of caution.

Pollution conditions in the Penobscot River-Estuary-Bay system pose problems that are quite different from those of other river-estuarine complexes. Although the outflow of the Penobscot River is less than that of the Androscoggin-

Kennebec system, the long, relatively narrow embayment of the Penobscot creates conditions which are quite different from those of the lower Kennebec or other tidal rivers. The long axis of the Penobscot system is approximately 35 miles in length. An increasing amount of the adjacent shorelines, flats, and overlying waters is threatened with contamination from sources upriver and in the upper bay area. This situation threatens not only the soft-shell clam resources, but even the most valuable of marine resources in Maine, the lobster resource, with oxygen-depleting organic wastes as well as toxic chemical and industrial wastes. We have long observed an association between Gaffkya homari, commonly called "redtail," and the presence of unsanitary water conditions.

I would like to digress momentarily to say that under some storage conditions we have experienced or observed mortality rates of 50 percent on lobsters, so this is a very serious disease as far as the lobster fisheries are concerned.

Historically, shellfish growing areas of the upper bay were first closed in 1946. Since that time, more and more closures have been required along the entire upper perimeter of the bay and the lower estuary. Increases in poultry processing and other industrial and commercial expansion have required a drastic increase in the acreage of flats and waters closed because of pollution.

In November 1954 about five miles of shoreline and a fivefold increase in the total area of flats and overlying waters were added to the original Belfast Bay closure. Prior to this time, 50 commercial diggers had been licensed in the Belfast area alone.

Surveys were made by the Department to locate sources of additional pollution because of the spectacular increase in bacterial scores that had occurred in the preceding three-year period. The surveys indicated that the increase in pollution could be attributed to an expansion in chicken processing, the establishment of a small industry, and the construction of new homes.

Additional closures have been made periodically since that time despite warnings from the Department that conditions were getting worse and despite the efforts of the Department to arouse interest in the problem. Finally, by July 1, 1966, the last remaining open areas were closed, making the closure complete from Great Spruce Head in Northport up the Penobscot River and down the east shore to Castine.

The Upper Penobscot Bay Area has, over a long period of time, produced an abundance of high quality clams, and shellfishing management personnel have worked for many years with the communities that are so vitally concerned with the management of this resource. Particularly active management programs have been carried on in Islesboro, Stockton Springs, and Searsport.

The estimated population of clams of the area primarily affected is well documented in the published report of the United States Department of the Interior, "Report on Pollution - Navigable Waters of the Penobscot River and Upper Penobscot Bay in Maine." The Department of Sea and Shore Fisheries cooperated with the Federal agency in gathering this information.

The Department is the state shellfish control agency. Decisions on the quality of growing area waters are made to conform with the health-protecting requirements of the cooperative United States Public Health Service-State-Industry National Shellfish Certification Program.

In order to provide assistance to clam diggers and communities of the Upper Penobscot Bay, the Department of Sea and Shore Fisheries has strained its limited personnel and laboratory resources. We have developed a comprehensive water monitoring plan, directed toward accumulating enough data so that we could determine what seasons of the year might be safe for digging in part of the areas affected by the Penobscot and other local source pollution. Generally conditions have been satisfactory during February and March, before the onset of the spring freshet. At this time we have had to concentrate our shellfish and water testing program since safe conditions are largely dependent on prevailing offshore wind and seasonal river flow. We have to be prepared to close the area on short notice. At times, the full capacity of our water laboratory and sampling crews has been used.

Commercial fishermen and the Department are concerned with industrial pollution in addition to human and animal waste. There have been repeated and almost chronic instances of oil spills which fouled both fishermen's boats and gear and the clam flats.

It is our conclusion that pollution abatement in the Penobscot River and river-affected coastal areas is essential to the economy, public health, and future development of the coastal area.

We have estimated, very conservatively, that the shellfish growing areas presently closed in the upper bay area would produce on a sustained basis 50,000 bushels of clams, with a local economic value between one and two and one-half million dollars.

Thank you.

MR. STEIN: Thank you, Mr. Dow, for a very excellent, succinct and comprehensive statement. It is a statement that was indeed very good.

Senator Muskie said that you people were very knowledgeable, and he did not say this lightly.

Are there any comments or questions?

MR. KLASHMAN: Mr. Dow, I wonder if you could explain a little bit more about the disease of the lobster?

MR. DOW: Yes. It is Gaffkya homari.

MR. KLASHMAN: Yes.

MR. DOW: Actually, Phil Goggins, our bacteriologist, who is here, can give you more detail on it than I can. It is a blood bacteria tetrad, and it was first described by Taylor in 1946.

We had received a warning from one of the operators in Maine that he had found a large number of lobsters dead in the bottom of his pond. The lobsters looked perfectly normal in the water, but when they got them in the pond they were all dead.

This is a very toxic, virulent organism. We have had various, I won't say epidemics in different years. 1946 was one year, and I believe 1949 was another one. 1960 and 1961 were bad years. We have associated it with unsanitary conditions, primarily, of course, in storage areas - like in the holding ponds. It has been reported among wild lobsters in northern Maine. We have had a few unconfirmed reports.

MR. KLASHMAN: Do you know where it has been reported - I mean, what parts of the country - in the wild lobsters?

MR. DOW: It was reported in the European lobster.

MR. KLASHMAN: In other words, this is a bacteria?

MR. DOW: Yes.

MR. KLASHMAN: In other words, what you are saying is that there is a danger here? I just want to make sure.

MR. DOW: Yes, that is correct.

MR. KLASHMAN: There is a danger that this could wipe out the lobster industry of Maine?

MR. DOW: I don't say it would wipe it out. I think it might create a buffered area in which lobsters could not exist because of this.

MR. KLASHMAN: What you meant is that if this type of disease were to spread, you could ----

MR. DOW: It is through contact only, as I recall it. For some years we thought the feeding had affected lobsters and transmitted it, but apparently it is contact.

MR. KLASHMAN: Thank you very much.

MR. STEIN: Thank you.

May we have the representative of the Penobscot Poultry Company? Will Mr. Buzen make the statement for the Penobscot Poultry Company?

# A BRIEF EXPLANATION OF THE CHANGE IN SIZE OF AREAS BECAUSE OF POLLUTION

Because of pollution, the closures in Penobscot Bay started in November 1947, with Closed Area No. 32 being a small closure from Patterson Point due south to the opposite shore and the closure became larger until in 1963 the area was closed from Old Steamboat Dock in Searsport to Great Spruce Head, Northport. Closed Area No. 33 was also promulgated in November 1947, as an area from Mack Point to Moose Point and the pollution spread until in June 1966 the whole area from Old Steamboat Wharf to Fort Point, including Sears Island (Closed Area 33-A) and Cape Jellison (Closed Area 34) was closed. From Fort Point east to a point on the opposite shore has been closed since November 1947 (Closed Area No. 35). In November 1947, Closed Area No. 36 was set up as an area from Dice Head to a point on the peninsula opposite Negro Island, including Hatch Cove. The latest description of Closed Area No. 36 (July 19, 1962) starts at a tip of land at the southern entrance to Hatch Cove, to Dice Head, thence northerly to the shore at West Penobscot which is the southern boundary of Closed Area No. 35.

Thus, currently the shores, flats and waters of the Penobscot Bay and River are closed to the digging of clams, quahogs, oysters, mussels and other marine mollusks from Great Spruce Head, Northport, northerly to Old Steamboat Wharf, Searsport, and from Old Steamboat Wharf to Fort Point, Cape Jellison, to the opposite shore at West Penobscot, thence southerly on the west shore of Castine to Dice Head and up to the tip of land at the southern entrance to Hatch Cove.

June 1967
Augusta, Maine
State Department
Sea and Shore Fisheries

## STATEMENT OF FRED G. BUZEN, GENERAL MANAGER, PENOBSCOT POULTRY COMPANY, BELFAST, MAINE

MR. BUZEN: Mr. Chairman, Conferees, Ladies and Gentlemen:

My name is Fred G. Buzen. I am General Manager of the Penobscot Poultry Company plant in Belfast, Maine.

Penobscot Poultry Company was founded in 1939 as a small poultry dressing operation and in the short intervening time has grown to a large ready-to-cook and further processed poultry operation.

Today, Penobscot Poultry Company is one of the largest poultry raising and processing operations in Maine. Here in Belfast, together with Maplewood Packaging Company, we account for 50 percent of Maine's total poultry industry -- handling more than 40 million birds each year, weighing more than 150 million pounds. Our community value is in excess of $25 million. In Belfast alone, the poultry industry employs more than 800 people, accounting for approximately 50 percent of the total employment in the immediate area. Through contract raising of chickens, we provide cash income to local farmers.

Due to many variations in marketing, the poultry industry is being reduced in numerical size because of extremely high competitive conditions. Our principal product, which is termed in the trade "fresh ice packed fryers," may be marketed immediately on processing because of short wholesome shelf life. The nature of the business requires that we forecast market conditions three months in advance to determine what our exact production rate will be; and breeders must be programmed eighteen months in advance. Upon this production determination, we incubate eggs from a layer flock for 21 days and, thereafter, raise our carefully selected breed of fryers for about 9 weeks. From the time we make the decision, we are investing money in the growing of birds and any curtailment results in pure loss of the investment. When the birds have reached the proper weight, any delay in processing for market results in further expenditures. We are, therefore, locked in, so to speak, on commitments made to ourselves to produce three months, and eighteen months, earlier. If the market is overproduced, prices will be low and we do not recoup our costs when the birds we have grown must be distributed.

With this background, we are here today to discuss the report and recommendations of the Federal Water Pollution Control Administration on Pollution of Navigable Waters of the Penobscot River and Upper Penobscot Bay. I would like to point out that our company policy is a continual upgrading of pollution control measures at as rapid a pace as is practical, consistent with the general public welfare and good business judgment, and believe it is important for all segments of our society including business and government to work together realistically to achieve progress in assuring the purity of our waters.

As you no doubt are aware, poultry processing is regulated by the United States Department of Agriculture and we must comply with their regulations as issued under the authority of the Poultry Products Inspection Act of 1958. In the eviscerating of poultry, USDA requires, among other things, that various components of a bird be continually washed to insure a wholesome and clean product to the consumer. Our process, therefore, requires a high volume of water ranging from 8 to 10 gallons per bird, and we use only pure well water.

The Metcalf and Eddy Report to the City of Belfast of January 1966, stated that by chemical analysis of waste waters Penobscot Poultry Company losses were some 6,800 pounds of product per day. Considering our total process weight, including water, this is an operating efficiency of some 99.9 percent. Looked at another way, about 10 percent of the product weight gets comingled with many hundreds of thousands

F. G. Buzen

gallons of water, and we must remove from this high volume the very small particles that become dispersed or diluted in this stream. Our efficiencies on a total product weight basis are about 98.3 percent.

Greater efficiencies require recapture of very small solids, dispersed insolubles and clean-up wash through very sophisticated equipment. The attendant high capital and operating expenses have not been economically feasible in this marginal industry.

We are flattered to note from the Federal Water Pollution Control Administration Report that our suspended solids and oxygen demand equivalents are indicated at less than half the determination in the Metcalf and Eddy Report. The bacterial equivalent is, however, too high, inasmuch as we do collect a substantial part of the waste and domestic waste, of course, is in the municipal system. Also our birds are not fed a minimum of 12 hours prior to evisceration and we are advised by poultry husbandry experts that five hours retention of fecal matter in a bird is about maximum. Therefore, our bacterial contamination, if any, is a much smaller contributor than the report states, and in and of itself would not cause the contamination of shellfish beds in the area.

Notwithstanding these circumstances and the myriad problems in the poultry industry, we have supported the State of Maine Water Improvement Commission in its efforts and subscribe to the establishment of pollution abatement in the total Penobscot Bay Area, giving due consideration to specific operations and limitations inherent thereto. In this connection, we have proposed to the Maine Water Improvement Commission a program of abatement of our effluent discharge to Belfast Bay which has been approved. Based on the chemical analysis of Metcalf and Eddy of our effluent as well as more recent analyses by the University of Maine which substantially confirms the Metcalf and Eddy findings, our program calls for reductions averaging over 90 percent in our present effluent loadings. This is equivalent to the maximum capacity of a secondary treatment facility. We feel certain we will meet the recommendations of the State Water Improvement Commission and the Water Quality Requirements, Table 2, in the report of the Federal Water Pollution Control Administration, that is, BOD reductions equivalent to secondary treatment, substantially free of grease and solids, no color and no turbidity that will cause significant contrast with natural waters and coliform bacteria under 1,000 MPN/100 ml.

Our program, incidentally, has started and in-plant process control changes should be completed by this fall, resulting in substantial reductions in effluent content.

Based on analysis and tests of remaining contaminants in our effluent after implementation of in-plant controls, we will design and build a facility to achieve the reductions indicated. The final date has been recommended at late summer, 1968 -- two years earlier than the report recommendation.

We believe that, together with the State Water Improvement Commission, a realistic program of abatement for the area can be obtained to the benefit of the entire State, including the shellfish industry. We would recommend that the abatement program resolved by this conference re-evaluate proposed water quality criteria to be certain the design meets the requirements which best serve the general welfare in achieving the required use of the total area. This means that the natural rejuvenative powers of our water resources should be considered. It also means that the criteria should not impose restrictions greater than necessary to meet the need, or which are technically unfeasible, or which are economically unreasonable, or which place unreasonable burdens on the future growth and prosperity of the area.

We very much appreciate the opportunity the Chairman has afforded us to participate in the conference and believe that the Federal Water Pollution Control Administration has done an excellent job in developing its report and recommendations overall. We believe that the accommodation of the considerations presented herein will add to the excellency of the recommendation, and will contribute to the general economic well-being of the State.

MR. STEIN: Thank you, Mr. Buzen.

Are there any statements or comments by the conferees?

MR. KLASHMAN: Mr. Buzen, I notice on Page 4 of your statement you talk about meeting this 1,000 MPN per 100 milliliters in the water, but you make no mention about the requirement in the report that the effluent will have 5,000 per 100 milliliters. Is it your intention to meet that too?

MR. BUZEN: Yes.

MR. KLASHMAN: So that you will meet the requirement of 5,000?

MR. BUZEN: We will meet all the requirements in Plan #2 of your report, and of the classification you gave to that water.

MR. STEIN: By the way, sir, I think you have made a very constructive statement.

I have been working with the poultry industry for a long time. You said you started in 1939. I did not begin this until 1946, when I came back from the war, but the difference in the view and participation of your industry as exemplified by this in waste treatment has been amazing, although a good portion of the work that we were engaged in then was dealing with in-plant sanitation.

I worked on that poultry code and sanitation code that was developed in the early 1950's.

I do recognize your point here. There are points both for and against the poultry industry. You know, this is one of the few agricultural industries that does exist without a subsidy, but they do have a flexibility in marketing operation, and this is good for the economy.

As Mr. Buzen points out, they have a short cycle. They have about a six-week cycle.

MR. BUZEN: Nine weeks.

MR. STEIN: A nine-week cycle to grow, and you have a flexibility in that industry that, for example, you do not have in many others, including the other major industries that are going to be represented here - the pulp and paper industry.

I recognize the importance of the poultry industry, not only what the poultry industry has done in areas like Maine and several other places, but its effect on the economy. As a matter of fact, poultry is produced so economically by the American poultry industry that we have been successful in marketing it to England and Europe. As a matter of fact, until recently the American poultry industry was successfully competing with the frogs' legs industry in Japan, even considering the cost of labor, which is very low, to collect these frogs' legs. We are all for your industry to build it up.

The question that we have to face here is: Are the poultry industry and, in a sense, the shellfish industry compatible in the Penobscot Bay area?

MR. BUZEN: There is no reason why they should not be.

MR. STEIN: That is right. I think they can be.

Recognizing what is done within the plant, the restrictions and the requirements that we have for processing a healthy bird - and these people live with this all the time - what you do is get a bird that isn't frozen but that the ladies like chilled. It must be in a reasonably decent condition. My view is, sir, that if we were to apply at least a little of the same kind of care to the wastes that we do in processing the bird through the line, we would be able to have those shellfish and the poultry industry co-existing side by side.

We are dealing with an organic waste which is amenable to known methods of treatment. It may be expensive when we get down to the point, but I do think this is something that your industry can do. I believe we can come up with a reasonable schedule.

I am not sure, maybe Mr. Klashman will check it, but I would hope that the effluent that you put out would not be too high to support the clam industry.

MR. KLASHMAN: I just want to make sure I understand exactly what the industry is proposing to do.

Do I understand correctly that in the effluent itself you will be meeting a 5,000 per 100 milliliter requirement?

MR. BUZEN: That is correct.

MR. KLASHMAN: In the effluent itself?

MR. BUZEN: In the effluent, in the **outflow**.

MR. KLASHMAN: Yes.

MR. BUZEN: Right.

MR. KLASHMAN: And in the immediate receiving waters, you will be meeting the 1,000, which you said in your report?

MR. BUZEN: That is correct.

MR. KLASHMAN: And that therefore, in the shellfish growing areas which are adjacent to this area, your contribution would not be above this area of 70?

MR. BUZEN: That is correct.

I would like to point out one thing here. If you will stop and think of what the previous speaker said as to how the clam beds were closed, the clam beds around the poultry plant were the last ones to be closed, not the first ones, so we contribute a very small portion of this.

MR. STEIN: Again, you have raised a point where you say, "therefore, our bacteria contamination." You are going to have some?

MR. BUZEN: We always have some in any type of process.

MR. STEIN: That is right. You say that your bacteria, if any -- I can see that is a nice industrial statement, but you say in and of itself it will not cause the contamination of shellfish beds in the area. This may be true.

What we are doing here is dealing with the accumulative effect of industries and municipalities, and when a new industry comes in, if they are the last ones and they are adding to the load, they may be the ones that are doing it. That doesn't say that just because you were the last ones you are any more responsible, but it is a question of a co-equal responsibility.

Again, if our scientific people think this will protect the shellfish beds, this will be fine. I know the poultry processing industry can do this, because years ago, at least when I worked in here, we used to have the problem -- and I think you still do -- where you take those chickens and you put them in a big box full of ice. If you have a sick chicken, the last one that goes into the box of crushed ice, you get the bugs spread to all the other chickens, and the ice does a wonderful job of preserving them. So you are dealing with a very delicate problem of food processing and have to keep these chickens fairly clean in order for them to be marketable and go around again and again. Otherwise, these people would not be in business.

Now, the point is, taking the same care, we should have a treatment process or an effluent coming out of a chicken processing plant which should permit the shellfish beds to be opened.

Mr. Dow, did you have any comment? Do you want to come up?

MR. DOW: Yes, I have a comment to make.

MR. STEIN: Come up.

MR. DOW: The statement made by this gentleman is completely contrary to the record. This record is right here in the Department. Every time, with an expansion, we got an increase in bacterial spores and we had to close additional flats. These are directly tied in.

MR. STEIN: Don't go off.

Do you want to say something?

MR. BUZEN: Perhaps I misinterpreted your statement. As you described the closing of the clam flats, you started in the upper Penobscot River and then came down, and just recently closed these around Belfast. This is what I understood you to say.

MR. DOW: The first flats were closed in 1946. These included Belfast Bay. They are shown on the map. There is also the portion of the Penobscot above Fort Point, as I recall. You can verify that on the map also.

Of course, this was attributable to the pollution coming down the Penobscot. The closure here at Belfast was attributable to local sources of pollution.

As I said before, every time there was an increase in poultry processing, we had an increase in the bacterial spores and we had to close more flats.

## STATEMENT OF FREDERICK B. YOUNG, LOBSTER FISHERMAN

MR. YOUNG: Am I going to intrude here, being a lobster fisherman and clam man and living in the bay all my life, in Belfast?

Every one of the people here are a nice, intelligent bunch of people, if I do say so, and our Mayor here will vouch that whatever I say is the truth.

I have dragged scallops away out and have your entrails from your chicken plant on my scallop wire, which is 1,200 feet long, and I have caught lobsters out there, and I fished for cod and haddock with Gloucester fishermen over the years down in our bay, which is all gone now due to pollution. We have lost a million dollars worth of scallops. We have lost our recreation. We have lost everything due to pollution.

Now, as president of Penobscot Poultry -- and you are a very fine man, without any question, and I think I talked with you years ago -- now, why, for God's sake, can't we clean up this mess?

Please, I'm right on the point of going out of business myself, because I have to pump that sea water in my lobster pound. I have a pound that I am really proud of. I handle 40,000 pounds.

I know I have fished and worked for years from Prince Edward Island way down to Bath, Maine, and I have a good name all over the coast of Maine. I've got a son who is lobster fishing, and we see our bay deteriorate day in and day out. We have lost our foundries. We have lost our recreation.

I've got 80 acres of nice shore property that I hope some day -- and I bought this from Central Maine Power of Goose River, and Mr. MacDonald will acknowledge that, that the State of Maine would take it over for a nice park for people.

We can't go down the shore any more. Our shores are littered. We slip and slide on the grease.

We have our Sea and Shore Fisheries. We have men right here today. Look at them, Mr. Dow and Mr. Goggins, Sea and Shore Fisheries. They worked with me for years, some of the nicest men you could ask for, but what have we got? You just dump everything on to us.

My shores are littered from A to Z. I can't go down to my shore on a picnic any more.

What are we going to do?

I mean, I am right at the point of committing suicide. Now, that's honest to God.

I have worked all my life. I've got seven grandchildren. Wouldn't I love to see the day when I can go down and see my grandchildren swimming again on the shore?

I know I am interrupting this meeting. I have put my foot right in it, but I've got to speak my piece, because if somebody doesn't do it, how are we going to get it cleaned up?

Now, you are head of the Penobscot Poultry and, pardon my figures, you made four or five million dollars last year. Why can't you help us clean up? We will work with you. We will do anything. In fact, I would just as soon help sweep the streets of feathers to help clean up.

You can understand my situation. Is there anybody here who can see? I've got some of the boys up here who have dug clams for years, everybody.

MR. STEIN: Mr. Young, let's see if we can--do you want to make a comment on that?

MR. YOUNG: You can shut me off any time you want to.

MR. STEIN: I am not shutting you off.

MR. YOUNG: But I have to speak my piece.

MR. STEIN: You are going to get a full opportunity.

MR. YOUNG: I would like to say something else. I have stocked the pond with alewives, with the help of Sea and Shore Fisheries, and pollution came down the next day --not the next day -- the next month or two, and killed them off. We are trying to get alewives around over there.

I used to fish for the Bangor salmon when I was a kid, and I will never forget it in my life, seeing the Atlantic salmon rolling out there. You don't know what that is.

Now we go down, my boy -- well, we have been fishing down there with salmon as long as that (indicating). Okay.

Now, if we are going to keep up this pollution from end to end, where are we going to come out? I told my wife, I said, "Belle, if you will move up with me to Nova Scotia, we'll go up there and settle up there," and get out and let you, the Penobscot Poultry and Maplewood, have the city, but it isn't necessary.

All we ask of you, will you please work with us and help us clean up? That is all we ask. There is room enough for everybody.

Now, am I out of order here?

MR. STEIN: No, you are not out of order.

MR. YOUNG: Do you think I'm in good order and everything?

MR. STEIN: This is why we are here, and that is to frame the issue.

MR. YOUNG: Now, here is a picture that I want you to see (indicating).

This is our $50,000 landing right down here, and those are poultry feathers on the incoming tide. Can you imagine that?

My boy the other day went down along the wharf, and he was all chicken grease.

I ask you, if you had done your share in the morning and go to work and you come up over the dock all chicken feathers and sit in your chair, wouldn't you be mad at somebody?

MR. BUZEN: Yes.

MR. STEIN: When was that picture taken?

MR. YOUNG: Last fall.

MR. STEIN: Did you take it?

MR. YOUNG: No, I didn't take it.

MR. STEIN: Did you ever see conditions like this?

MR. YOUNG: Yes, right around my wharf all the time, every day, and I can go down on the end of my wharf, which used to be in good, clean water, which I was brought up in, and go and catch flounders from A to Z, and now I go down to the end of my wharf and I can sit down and cry. I could set right out there and cry, a grown man.

Now, I may be out of order here, but I am putting my case the way it ought to be.

So you, as head of Penobscot Poultry, a nice man -- you're a nice company; you are doing a wonderful thing for the State of Maine -- but will you work with us and clean up this mess, please?

We have lost enough salmon. The Penobscot River was cleaned up a dozen times.

How are you going to pound it through to the average man how many thousands of dollars he is losing by neglect? This has been on my mind. I am going to go crazy. In fact, I'm a crazy man now. You could probably put me right up in a strait jacket as far as I am concerned. But I spoke my piece.

MR. STEIN: Right.

MR. YOUNG: And every one of these people here are all customers that have at some time or other bought a lobster or a good, clean clam from me, but when I've got to pump that damned stuff out of the water and try to keep my product nice -- I ship lobsters. I used to ship lobsters to Albuquerque, New Mexico. If what they got did not arrive pure, they used to say, "Ship us some more," but we can't do it with the conditions that we are up against now.

Now, you are the head of Penobscot and I know Jim Ellison is here in the crowd. Ben Hargart, if he was alive today, he started Maplewood. You could go and talk to them and clean this thing up.

Now, can you see what I am pounding at?

MR. BUZEN: May I only make one statement?

MR. YOUNG: Yes. You've got your part too, no question.

MR. BUZEN: I have just completed a statement here -

MR. YOUNG: I heard it.

MR. BUZEN: -- that we expect to clean up our pollution prior to the time which the Commission feels that it should be cleaned up in.

MR. YOUNG: Good. Well, thank you very kindly, and I'm sorry I hurt you.

MR. BUZEN: You didn't hurt me.

MR. YOUNG: But I have got to state my case, when I go to the end of my wharf and I look over and see chicken feathers, and see entrails go by. I damn you up and down. Why? Why? Why? And I have a good many people right behind me sitting right out there, and our Mayor right there, one of the best friends that I ever had in my life, will go along with us.

Is that right?

MR. STEIN: Mr. Young, do you have another copy of that picture? Do you want to put that in the record?

MR. YOUNG: I will give that to you.

MR. STEIN: All right.

(The picture referred to will be found in the files of the Federal Water Pollution Control Administration.)

MR. YOUNG: I hope I haven't disrupted.

MR. STEIN: Mr. Young, we would like for the record also, if you can supply it to Mrs. Piere over there, to show who took the picture.

MR. YOUNG: I will tell you who took the picture. I am not supposed to, but I mean -- I will see that somebody -- it doesn't make any difference anyway. There is no question that's chicken feathers.

MR. STEIN: I don't doubt it. (Laughter.) All right.

MR. YOUNG: Okay.

Well, I had a nice talk with you gentlemen, and no hard feelings, President of Penobscot Poultry. No hard feelings at all.

Commissioner Dow is an old friend of mine, and I met you yesterday, and I want to thank you for giving me the opportunity to express myself. I hope I have done it, and I know everybody out in that audience is with me a hundred per cent.

A show of hands.

(Applause.)

MR. YOUNG: Okay.

MR. STEIN: All right.

Now, let me say that we appreciate your comments, Mr. Young.

MR. YOUNG: I know I was out of order, because you had a dozen ahead of me.

MR. STEIN: That is all right. This, as you can appreciate, is what pollution control is all about. I don't think anyone here could have expressed it any better than Mr. Young, but I do think we have this point.

We have Mr. Buzen's point of view, and what he said in the statement for the future, without commenting on this, and I think the statements and any material that Mr. Young gave us speak for themselves.

The question is that Mr. Buzen said he is going to come forward with this program. As far as I understand his program, it means no discharge. That means no feathers, no entrails, no chicken feet, none of these objectionable sight solids that go in and fill this up.

Again, the organic wastes will be reduced. The bacterial loading will be reduced.

As we see this, unless the technical people tell me something different, when the program is finished that Mr. Buzen is going to do -- and, by the way, this is going to take a full-time job both by the industry, the State authorities, the local authorities, and the Federal authorities all working together to do this -- if and when this is done we will be able to have a compatible shellfish and fishing industry and poultry processing plants in this area.

There is no reason why we cannot do it. I think the statements or the aspirations of Mr. Young and the plans of Mr. Buzen are perfectly compatible. I cannot see any reason why you can't live together.

Mr. Young realizes, as he indicated, the advantages of the plant in the area. He welcomes you here. He just wants clean water, and you are ready to give it to him.

MR. BUZEN: Yes.

MR. KLASHMAN: Mr. Buzen, just so that I understand it completely, I want to review once more with you. I understand that the treatment plant you are going to put in is going to provide treatment for 90 percent removal of biochemical oxygen demand and the suspended solids. Is that correct?

MR. BUZEN: That is correct.

MR. KLASHMAN: You are going to have an effluent that will have no more than 5,000 MPN per 100 milliliters?

MR. BUZEN: Yes.

MR. KLASHMAN: He doesn't say that in his statement, Mr. Stein, but --

MR. STEIN: Let's be sure he means that.

MR. KLASHMAN: Is that true, Mr. Buzen?

MR. BUZEN: I am not following this last statement.

MR. KLASHMAN: In your statement, you do not say that the effluent from your plant will meet this 5,000 per 100 milliliters, but I understand that even though it is not in your statement, it is your intention to meet it?

MR. BUZEN: This is in Table II of your water classification.

MR. KLASHMAN: That is in the receiving waters, but in order to achieve that, we feel that you have to have 5,000 MPN per 100, and no more than that, in your effluent, and I wanted to make sure that that was your intention.

MR. BUZEN: Yes, that is correct. I follow that.

MR. KLASHMAN: Just one further question.

MR. STEIN: Yes.

MR. KLASHMAN: Further, that it is your intention, in addition to meeting the 1,000 MPN in the immediate waters, that in the shellfish waters or the shellfish growing waters, you will meet the 70?

MR. BUZEN: This is right.

MR. KLASHMAN: That is the requirement in Requirement No. 1.

MR. BUZEN: That is right.

MR. KLASHMAN: I understand.

MR. STEIN: Since there is understanding, all right. If there is any problem on this because of lack of understanding, let's have it corrected before we go on, or certainly before we conclude this conference.

As I understand Mr. Buzen's statement, if Penobscot Poultry puts in its waste program and the other cities and industries put in their waste treatment programs, there will be no reason why all the shellfish beds which have been closed cannot be reopened for shellfish harvesting and for shellfish shipping in interstate work?

MR. BUZEN: I am speaking only for Penobscot Poultry.

MR. STEIN: That is right.

Thank you very much for a very constructive statement, Mr. Buzen, and thank you for engaging in this, because that is the only way we can resolve these issues. I certainly appreciate it.

MR. BUZEN: Thank you.

MR. STEIN: At this point, I think we had better recess for lunch.

I said half past one. Let's give you another ten minutes, until 1:40.

(Whereupon, at 12:10 p.m., a luncheon recess was taken.)

## AFTERNOON SESSION

(1:55 p.m.)

MR. STEIN: May we reconvene?

Is anyone from Maplewood Poultry present?

(No response.)

MR. STEIN: If not, may we have the representative of the Town of Castine?

### STATEMENT OF JOSEPH F. SWINK, SECOND SELECTMAN, TOWN OF CASTINE, MAINE

MR. SWINK: Mr. Chairman, Conferees and Ladies and Gentlemen:

My name is Joseph Swink, Second Selectman from the Town of Castine, and I am one of three representatives from the Town of Castine this afternoon.

We in Castine think we have one of the loveliest towns in Maine, and are very much interested in correcting any pollution of our shores.

As you all probably know, we also have the best Maritime Academy in the country in Castine. This presents a little bit of a dilemma to us who are planning and have taken steps to provide sewage treatment for the Town of Castine.

J. F. Swink

We do need some clarification as to the responsibilities of the Federal Government and the State government with regard to the Maine Maritime Academy and the Town of Castine.

Presently we have a ship, a 10,000 ton ship, in the harbor of Castine, on board of which 250 midshipmen are living.

Our year-round population in Castine is approximately 650 people. In addition to the 250 midshipmen on board the ship, we have 250 more living in shore facilities.

Currently we do have 500 meals three times a day which are pumped down our town sewers used by the Academy and the town. The garbage of 500 meals has been recently pumped down our sewers into the harbor.

This does not correct pollution. I need hardly add we had an awful lot of seagulls there this summer.

My opinion is that the Academy is responsible for more than 50 percent of the raw sewage now going into the waters surrounding Castine.

It is not our attempt here this afternoon to blame anyone or place any blame for the pollution. Our attempt here is to determine the responsibility to obtain cooperation and proper aid of pollution in Castine.

We love the Academy. We want to work with them.

We want to work with the Federal Government very closely on this, but with our very small population in ratio to the population of the school, it presents quite a problem.

Thank you.

MR. STEIN: Thank you, Mr. Swink.

This Maritime Academy is not a Federal installation?

MR. SWINK: It is not a Federal installation, but it is subsidized by the Federal Government.

MR. STEIN: What is it?

MR. SWINK: It is a corporation.

MR. STEIN: Yes.

MR. SWINK: Subsidized by the Federal Government and the State government. The Federal Government furnishes the ship and about $70,000 for maintenance of the ship.

MR. STEIN: I don't think you can get rid of all the seagulls.

MR. SWINK: No. We have quite a few just the same.

Our community was somewhat outraged by the recent introduction of the garbage to the harbor.

MR. STEIN: You mean they are discharging raw?

MR. SWINK: They are discharging garbage from 1,500 meals a day down the sewer pipes into the harbor.

MR. MAC DONALD: Is it ground?

MR. SWINK: In their disposal. It is still garbage.

MR. STEIN: It is raw sewage?

MR. SWINK: It is raw sewage.

MR. STEIN: This is a horrible thought, but I think the law in this country is such that where a municipality opens its municipal sewers to industrial or institutional wastes, they are responsible for it.

Local municipalities make arrangements to get them to pay for adequate treatment.

I don't think you really have a very big problem. Have you had an engineering survey?

MR. SWINK: Not as yet. We are in the process of negotiating for one.

MR. STEIN: Because from what you say, the type of sewage coming from the town and from the Maritime Academy is amenable to known methods of treatment, and you should not provide any difficulty.

MR. SWINK: Well, I hope I didn't confuse it in any way. My remarks about the disposal and the discharge of garbage into the harbor, which is something that has come about within the past month and a half, were to the effect that when we have been all talking and thinking anti-pollution, this just adds to our problem.

We know it can be corrected, but by whom?

MR. STEIN: Well, again let me add - and I think the State is going to have to speak to you - but if you in Castine or any municipality accept anyone's wastes into your city sewers, this is going to be your problem. If you have a separate outfall, this is what we refer to in some of the poultry companies and paper companies as their problem, but once you put it into the municipal sewers, the municipality has accepted the legal and technical responsibility for treating the wastes.

MR. KLASHMAN: The question I have is: What kind of an agreement do you have with the Maritime Academy for their wastes? Is it just a simple thing of connecting it?

MR. SWINK: I know of no written or verbal agreement. The matter of the garbage disposal being used was first brought to our attention because of one local farmer who had been collecting garbage for 28 pigs was told he could no longer have it.

MR. KLASHMAN: May I suggest, it seems to me that what has happened in other communities is where this is a problem, you pass the necessary local ordinances so that this is not permitted. I mean, if you can't handle this, that is your privilege.

MR. SWINK: This is putting the cart before the horse.

MR. KLASHMAN: But it is going through your sewers.

MR. SWINK: It is going on through our sewers into the harbor. We have no disposal plant.

MR. STEIN: Let's go through this step by step. This is not an unusual problem.

Here is what happens: Someone is disposing of garbage and putting it in barrels or cans or trucking it away and generally feeding it to pigs somewhere. All right. They are also connected to a municipal sewer system. Then they finally decide to go modern and say, "Let's discharge it into the city sewers."

You may not consider it the best thing, but the law in this country is clear that once any city accepts this waste in their sewers, it is their responsibility. In other words, we have to look to you and not to the Academy for doing this.

The solution, as Mr. Klashman said, is to pass an ordinance or a rule stating that either they have to keep it out, or, if they put it in, they have to pay a fee so you can do something with it.

The present rule of law in this country is that once a municipality accepts the wastes from an industry or institution, connected in a sewer line into its sewer, it is responsible for its treatment.

I am not sure you have an insurmountable problem. Given the population of people you have in Castine and the people you have at the institution, I think you should make a determination as to whether it is more economical for these people to remove their garbage and refuse and not put it into sewers, truck it away and perhaps feed it to pigs, or put it in a land fill; or are you going to put it in the water ground up and be responsible for treating it?

I think it is a decision the Town of Castine is going to have to make.

MR. SWINK: I am sure you are correct as far as the legal portion of this is concerned.

What I mentioned was the moral issue of creating more pollution when the very purpose of your having this meeting today is to abate pollution. When this pollution is increased arbitrarily, this is the moral side of it.

MR. STEIN: I recognize the morals of it. We have them all the time. When we add garbage to this, we have a tremendously increased load to a municipal waste treatment plant. When a new industry moves into town and hooks onto a municipal sewer, the city is going to have a bigger job.

We have been faced with this many times. The moral issue is a question of growth.

Our problem is this, and that is, we have to keep the waters of this country clean. Someone has to be responsible. Generally, the people who are responsible are either municipalities, industries or institutions. Where the institutions or industries have separate treatment works and outfalls, they are responsible, but where a city will accept an institution's or industry's wastes into its system, the municipality or the town or the village is responsible.

Now, we can all differ on moral issues the way we are brought up, but I think the legal responsibility is clear.

I fully sympathize with you. If I were a citizen of the Village of Castine, I would either want these people to keep their wastes out of my municipal sewers, or pay their way, but this is a judgment for you.

I hope I am not overstating this, because I think the same law applies to them as it does to us. If you once accept this into your municipal sewers, the State or the Federal Government have no alternative under the settled law of this country but to hold the municipality responsible, and, you know, we just state the facts as we know them.

MR. SWINK: I don't want to belabor the point or argue the point. I am just presenting a dilemma that we have.

We still have the ship there being used as a dormitory, with 250 men.

MR. STEIN: Where are they hooked up to? Do they have a pipe going on shore?

MR. SWINK: They use the normal ship facilities.

MR. STEIN: What do they do, just flush it out?

MR. SWINK: I don't know whether they use any hand pumps or electric pumps.

MR. STEIN: They don't have to use anything on a ship. All they have to do is drain it to a lower level.

MR. SWINK: Whatever they use is just dumped into the harbor.

MR. STEIN: It does not go to the municipal sewer?

MR. SWINK: We have no municipal disposal system at all. We have a series of pipes leading down --

MR. STEIN: How many men do they have on that ship?

MR. JABINE: Mr. Chairman, we have a representative of the Maritime Academy here.

MR. STEIN: We will call on him when this is over.

All right. Thank you.

Are there any other questions?

MR. KLASHMAN: Yes. I just want to know what are Castine's plans as far as going about solving their problem?

MR. SWINK: Well, we have already had discussions with two engineering firms. Our planning board has to negotiate for a preliminary engineering survey.

I don't see how at the moment we can sign a contract with any engineering firm until we know just what the Maritime Academy is going to do.

MR. STEIN: Maybe we can find out right now.

Will you come up, sir? May we have your full name?

## STATEMENT OF JAMES A. LYLE, PUBLIC WORKS OFFICER, MAINE MARITIME ACADEMY, CASTINE, MAINE

MR. LYLE: James A. Lyle. I am the Public Works Officer at the Maritime Academy, and our plans are to move all of the men ashore. We do have 250 men living aboard the ship now, with raw sewage going into the bay.

We have asked the legislature for a number of years now for funds to build dormitories and move these men ashore. We have built one dormitory on our own with a capacity of 125 men, and then we have 125 in an old dormitory that was there originally. We have a total of 500 men, but we expect to go to 600 men. We expect to house all these men ashore, we hope, within the time limit that we have been given by the Federal Government or the State for the end installation of a sewage treatment plant.

However, this may not come about and we may be forced to ask people to be living on the ship as they are now under a waiver from the Department of the Interior, who controls the ship.

The ship actually belongs to the Maritime Administration, and as the school in Massachusetts is, we are charged with using the ship for housing only on cruises.

However, since we do not have the facilities ashore, we, along with other State institutions of this nature, are housing some of their people on the ships. In this case we have half of our people housed on the ship.

MR. STEIN: Let me ask you: What are you doing with the garbage grinds?

MR. LYLE: We have a new mess hall. To go back on that, the State requires that we join a municipal sewage system where one is available, and we had received permission from the town officials to join the sewer some years ago. Now we have built a new facility with a dining hall and student union, and we are now grinding our garbage there, as one would in a kitchen in a regular garbage grind, and it goes into the sewer and out to sea.

MR. STEIN: As you recognize, as an institution you are putting quite a big load on the municipality.

MR. LYLE: We increased the size of that sewer all the way to the bay.

MR. STEIN: I know, but it adds to the pollution load into the bay. Increasing the size of the sewer increases the pollution load.

MR. LYLE: There are different sources of pollution. When we moved in, there were two tons of raw uranium from the Atomic Energy Commission, and some people feel we are polluting the area with radioactivity, so we have also got raw sewage and we have got garbage.

MR. STEIN: I don't think we have any problem. Let's go through this one step at a time. If you had your men on shore --

MR. LYLE: Right.

MR. STEIN: -- would you think dumping raw sewage in the bay was the right thing to do? You would have to have at least a treatment plant or a septic tank or septic fields -- something to handle your waste -- wouldn't you?

MR. LYLE: We feel that the Town of Castine should have a garbage disposal --

MR. STEIN: You should get together with the town, but the point is, talking about putting it in and hooking it into a municipal system, let us suppose you were out in the country and you just had a big institution out in the country. You would not dump the wastes into the nearest lake or nearest stream. You would probably have some disposal plant.

MR. LYLE: Yes.

MR. STEIN: Now, you have 250 men on a ship. Why don't we apply the same philosophy and try to put some disposal system,as long as we have them on ship, to take care of their wastes?

In other words, if you had those 250 men living in a barracks or a dormitory on land, you wouldn't put a pipe into the nearest stream and dump their wastes into it, would you?

MR. LYLE: No.

MR. STEIN: Why, when you have them on the ship, do you think you can do this?

MR. LYLE: We feel that if the sewage treatment plant is installed in Castine, we would either join that sewage treatment plant or we would get the Federal Government to build one in the ship, or we move our men ashore, which we planned to do in the beginning all along, and the town treatment plant would be utilized.

MR. STEIN: But would you share the cost of the treatment with the town?

MR. LYLE: We are a State institution. We will ask the State and the Federal Government for help, yes.

As a matter of fact, right now the law requires that any ship that enters the Great Lakes have a sewage treatment plant on board, and they are developed and have been developed by the Navy for individual treatment plants on board the ship. This is not an impossibility. It would be expensive.

MR. STEIN: I don't know how expensive it is. What have you got, 250 men on the ship?

MR. LYLE: Right.

MR. STEIN: I would look into this. I don't know what the budget is. When you have 250 men, I think the plants are economical.

The problem is when we get to these small pleasure boats, when you get to a complement of 12 or 14 men, there may be a problem; but I think when you have 250 men aboard ship, generally speaking, the economics of putting in a treatment facility on board are not too bad.

The thing you have to worry about is in an operation such as yours, more than any others, particularly if you are on a ship -- and this is why I hope you get these men on shore -- it is a big load, because all the boys are going to use the facilities two or three times a day. You are going to have to have the kind of operation to handle that peak.

It would seem to me the best thing for you to do -- and I am not speaking lightly, as we have been through this many times -- is to get your men on shore as soon as possible.

MR. LYLE: This is what we intend to do.

MR. STEIN: Get them off and make an arrangement with the Town of Castine where you will pay your appropriate share.

If your load is as much as the Town of Castine says, it does not seem reasonable that you can expect the town to pick up the tab for your operation.

MR. LYLE: We don't expect the town to pick up our tab. We will be treated as a tenant.

MR. STEIN: Yes.

MR. LYLE: I just want to bring this up and ask you gentlemen what happened here.

Just before I retired from the Navy, they put in a sewage treatment plant in Newport, Rhode Island, that cost them $2 million. After they got through, they still had over a hundred ships with an average of 500-some men on the larger ships, and 100-some men on the smaller ones, for a total of 65,000 men on the ships without a sewage treatment plant. So far as I know, it is still the same thing.

These are federally owned ships, the same as ours. This ship does not belong to us.

MR. STEIN: By the way, what you are asking is another problem.

MR. LYLE: Well, it is the same problem.

MR. STEIN: I think we can get Mr. Klashman to talk on that, but the fact here is that we handle pollution where we find it.

If we have a stationary ship or a ship such as yours, the difficulty that we are faced with - and this isn't just in our Navy but the whole maritime operation - it is rare if all the pipes go to one place. There are as many as 10, 15, and sometimes 20 outlets. You were in the Navy and are aware of what the problem is. The ships generally run the waste discharges to the nearest opening and then they drop them.

Now, as you also know, on shipboard every inch of space counts. In order to change a pipe, you have to have a complete revision.

Given the existing ships we have, both in our own and foreign registry and our naval ships, it is very, very difficult to get all these pipes lined up.

Now, there is no excuse, but they are very severe pollution problems.

MR. LYLE: That is right.

MR. STEIN: The point is also that when you have a stationary ship in your own backyard, you don't have to live with those conditions.

This is one of our really tough problems that we are dealing with. My suggestion is that if you are a permanent resident of Castine, you don't want to live the way we have to live when we have to accept the conditions that we often find on ships.

MR. LYLE: I agree.

MR. STEIN: Off the record.

(Discussion off the record.)

MR. KLASHMAN: Commander Lyle, first, in our law, we have a provision, Section 11, which provides for the handling of wastes from Federal installations. It certainly is the Government's intention to make sure that wastes from Federal installations are handled properly.

Do I understand you correctly, sir, to say that this is a Federal installation, the ship itself?

MR. LYLE: The ship belongs to the Maritime Administration and it is on loan to us.

MR. KLASHMAN: But is it a Federal responsibility to operate it?

MR. LYLE: No.

MR. KLASHMAN: In other words, it is not really a Federal ship?

MR. LYLE: It is on loan to us, and as long as it is on loan to us, of course, it is in our custody.

MR. KLASHMAN: Second, did I understand you correctly to say that the understanding under which they loaned it to you is that you will not have people living aboard?

MR. LYLE: Not more than three months at a time on cruise.

MR. KLASHMAN: That is, the Maritime Commission --

MR. LYLE: They gave us a waiver, because we have no barracks ashore.

MR. KLASHMAN: How long does the waiver last?

MR. LYLE: It is renewed every year, and we are trying right now to get the State to build us some barracks.

MR. STEIN: How long have you had these men on the ship?

MR. LYLE: Well, the ship is gone three months of the year, when they are off on cruises.

MR. STEIN: How long have you had the men on the ship?

MR. LYLE: Oh, they have been aboard now since

1959.

MR. STEIN: 1959. You get a three-months permit?

MR. LYLE: I beg your pardon?

MR. STEIN: Three months?

MR. LYLE: Well, they are on cruise three months and they are off one month.

MR. STEIN: How long has your waiver been?

MR. LYLE: Every year.

MR. STEIN: In other words, you have had a waiver since 1959?

MR. LYLE: Yes, ever since men started living on board.

MR. STEIN: This almost becomes a permanent condition of life.

MR. LYLE: Yes.

MR. STEIN: It seems to me that the only solution is for you to join up with the Town of Castine as soon as possible and get a waste treatment plant, and get it treated, whether you are going to pipe it from the ship into the sewer or get your men on shore. It does not seem reasonable if we are dealing with a situation from 1959.

While I recognize the condition and what you have to do, it seems to me that if you are going to have clean waters up here, we have to recognize the facts of life.

Again, let me try to put it this way: It seems to me the Village of Castine has to put in an adequate waste treatment facility, and I think it is logical that you should have an integrated system. You will have to arrive at financial arrangements with them.

If they have to have the men on board ship, you have to arrange, at least on a temporary basis until they get them on shore, some kind of a pipe to connect them to the land-based sewer system.

Again, I don't know that we can ever stop garbage disposal, but I think you have to accept the fact that, like paved roads and television sets, garbage disposals are here to stay, in spite of this. You just have to make your arrangements to collect the wastes and treat them at a central source.

If you have any disagreement with that, I would like to hear it.

MR. SWINK: I would just like to state for the record that there is no conflict between our town, the Village of Castine, and the school. We do not intend that there be any conflict.

I brought this matter up primarily because it was my feeling that the Federal Government indirectly and the State government indirectly were aiding and abetting pollution of the Penobscot Bay and River, and I thought you gentlemen might be interested.

Thank you.

MR. STEIN: Thank you.

Are there any further comments or questions?

(No response.)

MR. STEIN: If not, the Maplewood Packing Company.

STATEMENT OF STEVEN GLASS, PLANT MANAGER,
MAPLEWOOD PACKING COMPANY, BELFAST, MAINE

MR. GLASS: Mr. Chairman, Conferees, Ladies and Gentlemen:

My name is Steven Glass. I am Plant Manager of Maplewood Packing Company here in Belfast, Maine.

Maplewood Packing Company is engaged in the processing of poultry at its processing plant here in Belfast. It conducts its operations in about the same manner as Penobscot Poultry Company, who has already made a statement before the conference. In the interests of saving time today, I will therefore not repeat the technical details that

Mr. Buzen has already discussed with you.

We have started a program of redesigning our present waste control systems, and I am pleased to see that, according to the report issued by the Federal Water Pollution Control Administration, our program has had some success already.

We are also in the process of surveying our entire plant operation in the light of the findings and recommendations of the two Metcalf & Eddy reports and of the present Federal Water Pollution Control Administration report. We expect to have, as a result of such survey, a specific plan for the control of our plant discharges that will meet the recommendations of the State Water Improvement Commission and the Water Quality Requirements, Section II, of the present Federal Water Pollution Control Administration report.

We are continuing, of course, independent of such survey, our in-plant program for reducing to the fullest extent possible the amount of contaminants in our waste discharge. We anticipate further success in doing so.

Thank you.

MR. STEIN: Thank you, Mr. Glass.

Are there any comments or questions?

MR. KLASHMAN: Mr. Glass, I just want to make sure that I understand you correctly, and that is, what you are saying again is the same thing that applies to Mr. Buzen.

MR. GLASS: Fundamentally sir.

MR. KLASHMAN: You will have your wastes, suspended solids, and BOD removal, as called for in the report?

MR. GLASS: Correct. We will comply with the report.

MR. STEIN: You don't see any problem in the poultry industry and the shellfish industry existing side by side, do you?

MR. GLASS: Well, I don't think that there should be. In the time allotted to us, giving us the necessary time, I hope, to correct these measures, I think ultimately there should be a coexistence between us.

MR. STEIN: You don't have a time schedule set forth?

MR. GLASS: We have no specific time schedule, other than that set forth by the report recently issued.

Our intention is to expedite this as quickly as possible, and, hopefully, prior to the period that has been set forth in the report.

MR. STEIN: Are there any other comments or questions?

(No response.)

MR. STEIN: This is a very good report. I am always pleased to see the subject as well covered as this one does.

MR. GLASS: We have tried to cover it. Thank you.

MR. STEIN: May we hear from the St. Regis Paper Company?

STATEMENT OF DAVID F. POLLARD, RESIDENT
MANAGER, ST. REGIS PAPER COMPANY, BUCKS-
PORT, MAINE

MR. POLLARD: Mr. Chairman, Conferees and Ladies and Gentlemen:

My name is David F. Pollard. I am Resident Manager of the St. Regis Paper Company mill in Bucksport.

St. Regis has a substantial investment in its Bucksport facilities. We have just completed a five-year, 45-million-dollar expansion program which provided additional jobs for the community. The company currently employs about 1,000 people at Bucksport. The annual payroll for 1967 will be in excess of seven and a half million dollars. It is expected that St. Regis will spend nearly ten million dollars in 1967 for mill products bought from Maine people. In addition, we also make substantial tax payments to the community, State and Federal Governments.

Within the last twelve years the mill has spent more than three million dollars for facilities that have reduced the effluent solids. Production during this time has been increased by approximately 60 percent.

Like other responsible public and private officials, St. Regis management recognizes the need for area-wide pollution abatement programs. We are making progress under the existing State Pollution Abatement Plan.

In keeping with the policy suggested by Federal officials for joint municipal-industrial treatment plants, we have initiated a cooperative study of the problem with the Town of Bucksport. It is probable that a joint plant will be the most economical solution for treatment of our industrial waste and the town domestic sewage.

Effective water pollution control programs require time -- time to properly plan, engineer, finance and construct. Title 38 of the 1964 Revised Statutes of the State of Maine specify a program of abatement over the next thirteen years. The three-and-one-half-year timetable recommended in the Federal report is not adequate for solving the problem at Bucksport. Perhaps the program could be completed in less than thirteen years, but only on the basis that Federal and State funds are provided to help do the job.

D. F. Pollard

The closing of shellfish areas in our bay was based primarily on the presence of bacteria associated with domestic sewage; bacteria for which we are all responsible. Pulp and paper mill process wastes do not contain bacteria associated with health problems.

We have read with interest the section of the Federal report indicating that low concentrations of spent sulfite liquor from pulp mills in the Northwest is toxic to oysters and suggesting that sulfite liquor in a section of upper Penobscot Bay "could be the reason that the clam resources are somewhat less than they were in the past." We understrnd that there is great disagreement among experts as to the toxic effects on oysters. Further, to our knowledge, no data have been presented to show that sulfite liquor has any effect on clams or shellfish in Penobscot Bay. We believe that, if such data exists, it should be presented to support the Federal recommendations.

No scientific basis has been presented for a water quality requirement of a maximum of 10 or 50 ppm of 10 percent sulfite liquor, as recommended in the report. These values appear to be needlessly severe.

We believe that the sulfite liquor effluent limit of 12,000 pounds per day, recommended for Standard Packaging and St. Regis, is not reasonable, but we believe this is corrected in the report as read to mean 12,000 pounds for each plant.

MR. STEIN: Correct.

MR. POLLARD: Yes. We believe that that quantity with the equipment presently available to our industry it is not practical to obtain greater than 85 percent removal of spent sulfite solids. This is substantially higher than the 12,000.

In closing, St. Regis will continue to cooperate with the State and Federal regulatory agencies. An ambitious, expensive program of pollution abatement will be required. Our company, our employees and our customers cannot afford a crash program. It is our opinion that our collective interests will be best served by a more reasonable schedule with more realistic water quality requirements for Penobscot Bay than are recommended in the Federal report under discussion.

Thank you.

MR. STEIN: Thank you, Mr. Pollard.

Let me ask you this: What do you think would be a more reasonable schedule, and what do you think would be reasonable requirements? Do you have any specifics?

MR. POLLARD: Well, not specifics, but, of course, we have stated **broadly** that the present program on the table has been healthy, that perhaps the thirteen years left in the State report is possible and perhaps conservative. We feel that in using numbers, perhaps seven or nine years would be more realistic.

MR. STEIN: You may be right on that. You might talk in terms of the years, but I also think we have some really difficult problems, and we want to try to work out something that we can get at realistically.

As you know, we have not done an extensive program with sulfite waste liquor in the Penobscot Bay area, as we have done in the Puget Sound area. I don't know whether it would apply or not. Some of the scientists think it would.

The question is, if we have to go through that, we could put a staff in and it would cost a considerable amount of money.

I think if we can arrive at a mutually agreeable program for the industry and us, we probably could save a lot of trouble in pushing this forward.

There were several points. One point is whether sulfite waste liquor is toxic to shellfish, and the other point is -- and we have the bacteriological experts here -- as to whether it creates a bacteria hazard to shellfish.

Let me take this, because we have an obligation to the audience. I think we have two problems here. One is whether the wastes put out by any industry -- and we are specifically talking about the pulp and paper industry -- are going to kill off the shellfish. The second point is whether those wastes that are put out result in big, fat shellfish and the shellfish will be full of bacteria which might then be dangerous to eat.

I don't want the slightest implication to be put forth in the way I have stated the program that the answer is in the affirmative in any case. What I am doing is stating the question. At least, the bacteriologists we have and the biologists we have think that there may be a real question here.

I think a lot of this can be resolved if Federal, State and the industries can agree on an action program for abatement so that we won't have to engage in these questions. I don't know how close we are on that. This is what I am trying to achieve.

For example, if we could determine the number of pounds of BOD which you consider reasonable to put out and the waste treatment you would put out and the time schedules for that, if we could work this out and this could be mutually agreeable, we might not have to engage in these other areas. This might be the best way to approach the problem.

MR. POLLARD: I am not an expert on the pounds of BOD and the other aspects of it, but we feel that the efficiency factors involved in the 12,000 figure for our mill are somewhat up in the range of 97 or 98 percent removal.

MR. STEIN: Even if you had 12,000 for your own mill?

MR. POLLARD: Yes. Now, this is weight of sulfite liquor.

MR. STEIN: Yes. What do you figure you could remove as a maximum, about 85 percent?

MR. POLLARD: Yes. We feel that 85 percent might be about the top of it economically.

MR. STEIN: You don't think you could push this to the kind of operation that, for example, Kimberly-Clark put in at their California mill?

MR. POLLARD: I am not familiar with that.

MR. STEIN: They removed enough wastes to permit their streams still to be used as salmon streams.

This is part of the problem here. You have heard from the fish people, and we would like to get this to a compatible operation. If the people are talking in terms of these anadromous fish, including salmon, and are talking in terms of shellfish protection, where the State can open these waters up, I wonder if we can arrive at some kind of mutual accommodation where we can agree and come to a proposal on where we can go.

I am not sure that an 85 percent reduction won't do that. Would you permit me to check with some of our experts here?

Is Mr. Kari still here? Would you come up, Earl, for just a second? Mr. Kari is from the Pacific Northwest.

I am not going to ask you to do anything we don't ask anyone else to do. We have talked in terms of 85 percent reduction in the Pacific Northwest.

Mr. Kari, what do you think would be the situation if we had an 85 percent reduction?

MR. KARI: Mr. Stein and gentlemen:

I couldn't speak actually as to what effect the 85 percent reduction would have in the Penobscot. I am not familiar with what is available to us.

MR. STEIN: What is the kind of reduction you are shooting for in the Pacific Northwest? Is that 85 percent?

MR. KARI: It depends again on the washing facilities in each mill. Some of the sulfite industries are able to approach 90 percent. Whether they are in some cases recovering this in an alcohol plant or some of it is evaporated, they are finally recovering solids, but they are approaching 90 percent.

This is what they are looking for.

Again, it depends on individual mills.

MR. STEIN: By the way, I thought it was closer to 85 percent out there. Is there any question here that you have any problem existing which is different from the mills in the Pacific Northwest?

MR. POLLARD: I wouldn't say so. I think the 85 percent with the standard of washing and recovering and so forth, might be feasible.

MR. STEIN: Yes, because I know, when we go to the 90 percent operation, if we hit 85 percent, what we do is advertise it as the optimum rate. We do not always get 90 percent.

However, the question here that I would like to raise -- and I don't know if we have this -- is what would happen if the mills reduced their wastes to an 85 percent reduction? What would we be able to do with this?

Do you know, Mr. Klashman?

MR. KLASHMAN: Herb , would you check me on this?

It would mean that they would be putting out 60,000 pounds each, which would be about 10 times the --

MR. STEIN: I am talking in terms of what this would mean to the shellfish areas and the anadromous fish.

MR. KLASHMAN: It will mean five times more, or 60,000 pounds would be coming out from each mill.

MR. KARI: The 12,000 pounds was arrived at based on the assimilative capacity of the stream.

MR. KLASHMAN: They now start with an effluent of 400,000.

MR. POLLARD: It is roughly double the production of the pulp, so that it might well be over 200,000 pounds per day.

MR. KLASHMAN: If it is 200,000 pounds and you are putting out 12,000 pounds, that would mean that you had somewhere around 90.

MR. POLLARD: Closer to 95.

MR. STEIN: I would like to have a view on this from the technical staff.

What is the feasibility of this 12,000 pounds per day?

MR. KARI: Again, in the Northwest, 90 percent would be the limit right now which is available with the washing facilities. It is 90 percent.

MR. STEIN: I don't want to push you too hard, and you may have to think about this and come back. I know these engineers can make quick calculations, but we are not going to ask anyone to do anything that is impossible. If 90 percent gets it to 18,000 --

MR. KLASHMAN: It would be 20,000.

MR. STEIN: 20,000? What is 85 percent?

MR. KLASHMAN: Starting with 200,000, it would be 30,000.

MR. STEIN: Let me ask you this: What effect would 30,000 from each mill, or a total of 60,000, have on the fish and the shellfish?

MR. E. HORTON GIRDLER: Mr. Chairman, may I speak for Standard Packaging?

MR. STEIN: Will you come up here?

I think we are at the nub of the situation here. This is the key question.

We are trying to explore the notion that we are not going to ask the companies to do the impossible.

Now, why don't you go ahead?

MR. GIRDLER: Well, I thought I should get in here because we have sulfite mills which are two different sizes.

MR. STEIN: Yes.

MR. GIRDLER: We have a mill at Brewer and one at Bucksport, which are different sizes, so that when you are talking about 30,000 pounds for Bucksport, then we should be talking 60,000 pounds at Brewer. If we are talking equal liability to the problem and we are allowed 12,000 as typical for us, this is 97 percent.

MR. STEIN: Let's talk in specific terms-let's see what we can do.

I should say for the audience here that we have been through this problem before. This is not a new one.

I think the point of the industry is well taken. When we ask them for an 85 percent reduction, we are really pushing them. It is true that they can get the 90 percent reduction sometimes.

I don't want to give you a bad analogy, but this is like Arnold Palmer playing a round in golf. You know, there are some times when he is going to go around in 65, and it is just like their 90 percent reduction; but by and large he is going to go around in 70. Maybe you will hit 85, and if all things are right, surely you can get up to 90.

If you are going to talk in terms of requirements, generally an 85 percent reduction is reasonably what we have asked as the best standard for reduction in a pulp and paper mill.

The point here is that we have to see if we can live with it. If they are going to put in 85 percent and this is what we can reasonably expect them to do, what is this going to do to the fishing or the shellfish, and what are we going to have when we get through?

In other words, let me put it this way: We don't want these people to put in a four or five million dollar installation just for a monument to water pollution control that is not going to achieve any results. It is dollars and it is money, and there is no point kidding you, kidding us, or kidding the industry. We want to really get at the facts.

Presumably, if you have an 85 percent reduction, what is that going to mean in pounds per day for both your plants?

MR. GIRDLER: Well, we are probably contributing at the present time a ton-for-ton production, so we are putting about 400,000 pounds into the river. A 15 percent allowance would be 60,000.

MR. STEIN: You would be putting in 60,000, and you people would be putting in how much?

MR. POLLARD: We have roughly 200,000, and 30,000 would be the 15 percent.

MR. STEIN: You would have 30,000, so that would be 90,000 pounds flowing in from the pulp and paper industry.

Now, let us assume we have this 90,000 pounds. What is that going to mean?

MR. KLASHMAN: It appears that this would cause a problem. We can't make a snap judgment on this, and we are going to have to evaluate it.

MR. STEIN: This is why we are here.

Again, I would like you people to look at this. The kind of expenditures we are talking about here are millions. When you talk about millions with us, maybe because we are public officials we are accustomed to spending millions; but when you ask Standard or St. Regis to spend three or four million dollars on a project, this is a lot of money for private industry.

What we are working out now is something where we want to be very, very careful that we are going to ask them to spend their money for something that is going to be worthwhile and when they get through that the people are going to know what they are going to get, so that we are not kidding anyone.

In other words, if, let us say, Standard alone is going to spend $4 million and St. Regis is going to spend $2 million, or a total of $6 million, and you think you are going to pick up clams where you didn't before and you are not going to be able to do it, then we are kidding you and we are kidding them. We should have a pretty good judgment as to what we are going to get for the $6 million before we come out with a requirement, and we should have, hopefully, an agreement from the State and from you so that we all know what we are buying for our money and no one could say, when we did all this, that we really don't have pollution control.

Again, I am not talking in terms of relative magnitude. I think we have the problem of the poultry plants under way. The big problem we are going to have is to work out an equitable solution for the paper plants.

MR. KARI: I might say this, Mr. Stein --

MR. STEIN: Yes.

MR. KARI: We are faced in the Northwest with problems similar to what they have here.

Essentially, the base of our requirements is it is not really feasible to provide the discharges with waters of assimilative capacity. In the Northwest, there is so much precluded from the discharge of waste of pulp and paper mills into the water. In the Northwest, they discharge into the ocean.

The estuarine environment in these areas will not provide the capacity without involving some damage to the receiving waters, so if this would cause damage -- and based on the requirements you have indicated in the report, I think that even 85 percent reduction on the part of both mills would not achieve the recommended levels in the report.

In the Northwest we have tested this on Pacific oysters and one species of English sole, and we found very little concentration of these wastes did have a very marked effect on the ability of these larva fish and shellfish to survive. The results of these studies are not available yet. They will be reported in the State of Washington next week.

This report concludes that this results in an abnormality or mortality for the oyster larvae.

There has also been work done with mussels on the West Coast. Some of this is sponsored by the National Council for Stream Improvement. Again, the areas in which they respond are not quite the same, but they are in the same general ball park. Fifty percent of them die and fifty percent survive.

Another study in the Northwest deals with fish eggs from the English sole, which is a very important commercial fish there. Most sole or fish of this type spawn on the bottom and the eggs drift to the surface water. The studies in this area have shown that concentrations of about ten parts would begin to cause some interference with the natural development and hatching of English sole eggs. I would say up to 180 would preclude hatching at all and development in the water.

These are new studies. As I say, it hasn't been until the last few years that this has come about, but again I want to come back to the point that if you are going to provide fairly complete protection of some of these shellfish and the spawnees of some of the more sensitive fish, it has been pointed out by a number of investigators in the investigated areas that they would have to maintain these lower levels.

It will be new in concept. The old approach is looking for the most obvious effect of dead fish. Well, if you concluded that, by the time this happens, a number of things have occurred that we are not able to detect.

These are some of the things that we have found out in the Northwest that actually show us that damage had occurred at a very low level, much lower than we had considered in the past.

If we are going to protect our environment, we are going to have the treatment. Again, how you apply this to this particular situation, I do not have enough personal knowledge to know, as far as the assimilative capacity of the receiving waters themselves.

MR. STEIN: Thank you, Mr. Kari.

I think you can see we have a pretty, pretty difficult problem.

MR. POLLARD: May I ask a question, Mr. Stein?

MR. STEIN: Would you speak up, please?

MR. POLLARD: The 85 percent factor we are discussing is a percentage of efficiency of the removal of dissolved solids?

MR. STEIN: Yes.

MR. POLLARD: It wasn't clear in the report as to whether the 12,000 pounds was dissolved solids, or whether it was some other factor.

MR. STEIN: Mr. Pahren, would you answer that question?

MR. PAHREN: It was sulfite waste liquor in a concentrated form, the type that comes out of the digestor.

MR. STEIN: Does that answer your question? I am not sure? Does that answer your question?

MR. POLLARD: That puts an entirely different light on it, because that is in the range of 10 to 15 percent solution at that point, so there is 90 percent water that we are talking about on that basis.

MR. STEIN: Do you think you can meet those requirements?

MR. POLLARD: No, we cannot meet those requirements.

MR. STEIN: All right.

Now, by the way, your points were well taken.

I wonder if you would let us do this: The way I see this, we have a really tough problem that we have to work out.

We have the bacteriological effect of the sulfite wastes. We used to think -- I did a few years ago, and I don't get my scientific information from any other sources than you do -- that these did not have a health effect. Lately we have been getting reports to the contrary.

We have Mr. Geldreich here. Would you come up and let us see if we can get this resolved, because the way I see this, we are going to have to do a little more work before we come up with a solution for the industry.

### STATEMENT OF EDWIN E. GELDREICH, MICROBIOLOGIST, CINCINNATI WATER RESEARCH LABORATORY, FEDERAL WATER POLLUTION CONTROL ADMINISTRATION, DEPARTMENT OF THE INTERIOR, CINCINNATI, OHIO

MR. GELDREICH: My name is Edwin Geldreich and

E. E. Geldreich

I am a research microbiologist in the Cincinnati Research Laboratory.

In the last few years, as Mr. Stein has commented, we have become very much alarmed with the problems of nutrient addition to streams. Paper mill wastes have about 2 percent total sugars present, and this isn't sulfite wastes, depending upon the process, and so forth.

When this material gets into the stream it mixes with the water, and we do find that we do have a condition where our organisms which have entered the stream above the paper mill wastes in this case are now protected by this nutrient and may even regrow.

The problem now is one of not a natural die-off of organisms downstream in a given length of time, but there is persistence and in some cases a multiplication.

In your shellfish program here, you are concerned with maintaining a level of 70 total coliform per 100 milliliters to meet the requirements for this particular industry. My concern is, are we going to have a problem with the total coliforms coming from the various sewage discharges mixing with the nutrients of the paper mill wastes and persisting at such a level or regrowing?

In fact, in the summertime you find that members of the coliform group will regrow in 20° Centigrade water,

E. E. Geldreich

which has been documented on many occasions. Will this now cause us to have an increased number of coliforms downstream, where our shellfish beds are located?

We must reduce the nutrients from the paper mill wastes. We have felt that this nutrient level could probably be handled if we had arrived at about 90 percent removal, the figures that have been discussed here this afternoon. This is only one part of the problem.

In some paper mills we have found that with the connection of the toilet facilities mixing in with the paper mill wastes, we can have an increased number of the fecal coliforms, and we have found Salmonella present in the effluents of paper mills.

I have a memo from George L. Harlow, Project Director at that time of the Detroit River-Lake Erie Project, dated June 24, 1966, in which he reports to me that they have found Salmonella from two separate paper mill effluents in that area.

Summarizing, basically we must reduce the nutrients so that the total coliform bacteria will not persist and will not regrow, so that when we get downstream to the shellfish beds, we can have the 70 per 100 ml that you are looking for; and we also must be concerned with the possibility that there are bacteria in paper mill wastes.

If there are cross-connections with the plant lavatories, we could possibly have Salmonella also in this type of waste.

MR. STEIN: Thank you.

Are there any further comments?

MR. POLLARD: Well, we certainly agree that human wastes and lavatory wastes and what not can be different from the sort of processed wastes of paper mills. Our remarks, as far as no toxicity from the paper mill wastes is concerned, were related to the process itself.

MR. STEIN: Yes.

Let me again try to put this in lay terms.

In terms of toxicity we have one thing, and this is a poison. In terms of bacteria, these people who have been checking have been finding with surprising regularity the pathogenic bacteria in the paper mill wastes. Where this comes from is a question.

We have some real, real problems. I won't mention this fellow's name, but this refers to farmland wastes and not a paper mill. This is a sugar beet mill. Our men have found some tremendous loads of pathogens in the wastes, and when they got to the plant manager, someone had told him that the way to dispose of these wastes in the sugar beet plant was to put them in an industrial waste pond and take the human wastes from the toilets and flush them into the pond.

Well, the temperature in that part of the country, as you have in mind was kind of cool. When we put those wastes into the pond there was a terrific growth.

I am not saying this is so with your wastes, but in almost every sugar beet or pulp and paper mill waste we have not only found pathogens in it, or oxygen depleting material, but we have found pathogenic material. This has caused us to look at this in a little different manner.

I am sure that no pulp and paper plant wants to put out any materials of this sort. This is something we are going to have to look at.

MR. GIRDLER: I don't think this needs to be in the record, but I am not so young that I wasn't around the sulfite business when we didn't have quite the instrumentation that we now have.

(Discussion off the record.)

MR. STEIN: Representatives of the pulp and paper industries have appeared before Congressional committees several times for the purpose of demonstrating that sulfite liquor was not harmful. It isn't a question of whether it is harmful or not.

Now, I agree with you on the zero count.

E. E. Geldreich

By the way, this is one of the big operations that we have. When we ever get up to a tolerance where you say no bacteria or no oil or no phenols, or you name the substance, generally speaking, what we are talking about is in terms of the methodology we have of measuring it. We can measure, say, down to parts per million. We say no oil and no phenols, and we measure parts per million.

We go along for five years, and then suddenly you see our bright young boys come up here. You get one of these bright young boys who comes up and he finds that he can measure this not in parts per million now, but in parts per billion, and where we got a zero result on the test before, we get five parts per billion. Then we say no more parts per billion.

Then we get another one of these bright young boys who comes up and he finds he can check this five parts per trillion, and there we are.

Again, let me say this: You can look at this. The point is that the accurate tests that the people have now are detecting the pathogenic organisms in the waste.

What I again am suggesting is not to be unreasonable, and goodness knows, our object here is to keep you in business and keep you going, to try to get together with you. We have done this with many other industries. Our object is to try to get together with you and get a group of requirements that you can live with and that we can live with.

I think in dealing with these requirements, like it or not, we are always going to have to take the new methods that the people are constantly coming up with.

Looking at this and hearing your statements,it is apparent we are at a point where our people are asking for something that you say is impossible for you to do -- and let me make this clear. This is not impossible to do on the question of staying in business. This is impossible to do if all the money in the world was available for it.

In other words, let's forget that it is St. Regis and Standard. Let us suppose we subsidized these plants with a billion dollars a year. What they are saying is that the requirements you are setting, if you give them all that, they could not meet them.

Now, with that, I think this joins the problem. We really have to face it, but I think we have two points here. One is the BOD and one is the toxicity of the material. The next is the pathogens.

The key point is this: If we come up with a reasonable amount of reduction that the pulp and paper companies can live with in this area, what kind of fish are we going to have in the waters? These are very difficult questions.

All right. Can we now call on Standard. Why don't you give your presentation?

## STATEMENT OF E. HORTON GIRDLER, RESIDENT MANAGER, EASTERN FINE PAPER AND PULP DIVISION, STANDARD PACKAGING CORPORATION, BREWER, MAINE

MR. GIRDLER: Mr. Chairman, Conferees, Ladies and Gentlemen:

I am E. Horton Girdler, Resident Manager of the Brewer, Maine, mill of the Eastern Fine Paper and Pulp Division, Standard Packaging Corporation.

This mill produces approximately 160 tons per day of fine papers and 190 tons per day of sulfite pulp and employs more than 700 people.

Our continuing company policy is to foster and support all feasible methods of reducing pollution. Since 1949 we have worked closely with the National Council for Stream Improvement toward the development of such methods. In the past five years we have significantly reduced the solids discharged from the Brewer mill and are currently implementing a project to further reduce the solids discharged from the sulfite mill.

We have cooperated willingly with the Maine Water Improvement Commission and have based our compliance program on the time schedule and water quality classifications enacted by the 1965 State legislature. We are now underwriting a joint study of a waste treatment plant to serve our mill and the City of Brewer.

After studying the February 1967 Department of the Interior Report on Pollution of the Penobscot River and Upper Bay, we are deeply concerned about the recommendations therein for the following reasons:

1. The proposed allowable level of sulfite liquor discharge requires a degree of reduction which is technically unobtainable -- short of shutting down the sulfite mill, and this is expected to be debated here in about five or ten minutes.

2. The proposed time schedule for compliance is so brief that we would be unable to comply in time even if there were available an economically feasible method of reducing sulfite pollution.

3. Tidewater industries and municipalities are being asked to shoulder the entire burden of abating pollution of the lower Penobscot River and upper bay without regard to

upstream water quality.

4. Although bacteria from sewage are the only type of contaminant proven harmful to the commercial value of shellfish, the report recommends that all forms of discharge into the river be dramatically reduced, whether toxic to shellfish or not.

If we are required to implement the quality standards proposed in the report and adhere to the time schedule therein, it appears that the operation of our already marginal sulfite mill would no longer be economically justifiable. Compliance would involve an estimated total cost of $9 million including in-plant capital expenditures approaching $3 million, for which there would be virtually no investment return and for which there are neither Federal nor State funds available. Shut-down of this operation would mean a major loss of employment and of production with a minimum value of approximately $7 million per year.

In view of the foregoing, we strongly urge:

1. That the State time schedule and water quality classifications be maintained; and

2. That we be granted Federal financial assistance for in-plant abatement expenditures.

We hope that favorable consideration of our recommendations will be forthcoming and that it will permit us to solve our share of the area pollution problem while still maintaining a stable operation at our Brewer mill.

Thank you.

MR. STEIN: Thank you.

Are there any questions or comments?

Mr. Klashman?

MR. KLASHMAN: Do I understand correctly that you are saying that a cost of $3 million for work in the plant, you could achieve the standards?

MR. GIRDLER: This is what we would do within our plant to get the effluents together and to put them in the hands of or into a joint city-industry plant, and we presumably would pay a sewer tax to the city for our share of the tax burden.

MR. KLASHMAN: Then your estimate of the city plant would be $6 million?

MR. GIRDLER: Yes.

MR. KLASHMAN: But from your study of this problem it appears that with this $9 million expenditure, as Brewer and your plant are concerned, you could meet the standards?

MR. GIRDLER: This is the estimate that was prepared for us, the city and Standard Packaging.

MR. KLASHMAN: Who prepared it?

MR. GIRDLER: Camp, Dresser, and McKee Company.

MR. KLASHMAN: So they did think you could?

MR. GIRDLER: Well, the study is now under way, and it is a revision of an earlier study which was done in 1964.

MR. STEIN: Again, the proposal here is that presumably if your $9 million operation went into effect, you could maintain the waters for shellfish production as far as your plant is concerned?

MR. GIRDLER: No.

MR. STEIN: Let me get that.

MR. GIRDLER: I said that technically it is not feasible to comply with the regulations which are proposed.

MR. STEIN: Right.

MR. GIRDLER: The 85 percent of our present load could be complied with at this cost.

MR. STEIN: Right. I was saying that for the record.

MR. GIRDLER: And, for the record, I am saying that the river at the Bangor Dam is already in such a condition as far as sulfite liquor is concerned, so that you can't grow shellfish down there anyway.

He says in his report that you have 260 parts per million of sulfite liquor at the Bangor Dam.

MR. KLASHMAN: We have that.

**MR. GIRDLER:** I don't wish to indict any other mill. I am just saying that this is a river problem, and the river does not end at the Bangor Dam.

MR. STEIN: Your point is well taken.

While we are dealing here with the physical facts, whatever our ultimate philosophy might be, physical facts can be measured. In dealing with the pulp and paper industry, while we may have been on opposite sides on many questions, I think we can say for them, and I hope they will say for us, that we both recognize the fact when it is presented.

As far as we are concerned, we have never had any problems with getting the facts and figures on what is going on, and I don't think there is any difference among us.

As you pointed out, we have a rather serious problem. If our objective is to see what we have to do to get the maximum growth of shellfish and shellfish available for harvesting and for shipment in interstate commerce and other fishing in the bay, we have to take into account all the sources of pollution that affect it.

If they come from above the area we have considered, we are just going to have to consider the whole area, because obviously we are not going to make these mills put in expenditures, at least speaking for the Federal people -- and I think the State has the same notion -- unless all the people do the same thing.

Are there any other comments or questions?

MR. KLASHMAN: By the way, do you folks have another mill upstream?

MR. GIRDLER: Yes.

MR. KLASHMAN: Is that mill doing any treatment at all, or are they putting their wastes in raw?

MR. GIRDLER: The mill that we have up the river has a recovery and incineration arrangement.

MR. KLASHMAN: That is part of the process?

MR. GIRDLER: Yes. This is not to say the mill is lily-white either.

MR. KLASHMAN: No, but there is no treatment of the wastes?

MR. GIRDLER: They are incinerating the wastes. Yes.

MR. KLASHMAN: I have no other questions, except I wanted to ask Mr. Pollard one.

MR. STEIN: Yes.

MR. KLASHMAN: Mr. Pollard, as I recall, when you were giving your statement you indicated that the St. Regis Paper Company had spent some $3 million on, I believe you said, waste treatment?

MR. POLLARD: Let me clarify that. Over the last ten or twelve years, I mentioned that $3 million had been spent to aid in improvements. Now, this is on equipment which is more modern than the older equipment, which is much more efficient as far as solids removal effecting relatively a better river condition.

MR. KLASHMAN: The point is that if you are putting wastes into the river, it certainly is not economical to do this because you are putting profits down the river.

MR. POLLARD: No. We have in our budget this year and for the next several years expenditures which are economic to our operation.

MR. KLASHMAN: What I mean is, these really are not waste treatment expenditures in the sense that we are talking about.

MR. POLLARD: That is right.

MR. KLASHMAN: These are process changes to do a better job.

MR. POLLARD: Yes. They are also designed to be economical in our plant.

They are also done with the knowledge that our problems in the past with the suspended matter were that it was not proper and we needed a little better treatment.

MR. KLASHMAN: I just wanted to make sure. These are not waste treatment?

MR. POLLARD: They are not waste treatment plants. Right.

MR. KLASHMAN: You do not have any waste treatment at your plant?

MR. POLLARD: We do not.

MR. KLASHMAN: Thank you very much, Mr. Pollard.

MR. STEIN: Did you have a comment, sir?

STATEMENT OF IRVING ISAACSON, ESQUIRE,
REPRESENTING MAPLEWOOD PACKING COMPANY

MR. ISAACSON: My name is Irving Isaacson and I am an attorney representing Maplewood Packing Company.

Do I understand from the previous discussion with the paper mill that equitable considerations will be a factor governing the standard to be applied to a particular industry as a level of expenditures required from them?

MR. STEIN: Sir, if we ever came here and said that we weren't going to apply equitable standards, we would have been out of court.

Eventually, if we have to enforce this -- and I hope we don't, because I think we are going to work it out in an agreement here, from what I have heard, certainly from Maplewood and Penobscot; we are going to arrive at an agreement and we are not far apart -- but if we ever came up from the Federal Government or the States with something which was not equitable, I don't think there would be any court which would sustain it, or any court that should.

I would hope that any agreement that we came up with here would be as much adhered to by you from the poultry processing industry as the pulp and paper industry and the States and us, and the cities, when we hear from them, because if we do not do that, we are not doing a job.

This is a conference. We are not here trying a case and prosecuting anyone. We are here trying to get an equitable agreement of all parties concerned.

MR. ISAACSON: Please understand me. All I am trying to find out for the record is whether the financial burden that any of these requirements may impose on a particular industry will be a consideration in any decision that is reached. Apparently it is, in the case of the paper companies.

MR. STEIN: Wait. Let's look at the paper companies here.

MR. ISAACSON: Yes.

MR. STEIN: I made this point, and I hope it has not been missed.

This is not a question with them of financial burden. As I said, let's suppose we in the Federal Government would give them a billion dollars and ask them to do it. They could not do it.

We are dealing with two factors here. When your industry came up, we were dealing with a financial burden on something which was possible. I think the financial expenditures from the pulp and paper industry are going to be considerable, but what we were talking about here in these considerations goes beyond that.

Money is not a factor here. This is a question of the state of the art, and whatever money they had, they could not do it.

It seems to me there are two questions here. Certainly, we are not going to ask you to do something that is going to put you out of business, or put you in a bad competitive position. That is one thing.

The other thing is we would certainly be in a weird position to ask anyone to do something that they cannot do, and we cannot do, and no one in this world can do, no matter how much money you had. This is what we have been talking about with the pulp and paper industry. Their problem is a little different than your industry's.

You know, I don't want to be invidious here, but this reminds me of an early novel of George Orwell, who wrote "1984," but in the other novel he says, "Blessed are the old with identifiable diseases."

You know, if the poultry industry has something that we know how to handle and all it is going to take is money, we are lucky. The difficulty is, what we are dealing with here is a situation where, given all the money in the world, we are not sure we can come up with the answers. There is a difference to the problem.

MR. ISAACSON: Difference in degree. Let's put it that way.

MR. STEIN: Well, it is not a difference in degree. It is a difference in kind.

Sir, let me tell you this: If I asked you to drop everything and go to Geneva tomorrow, and gave you a million dollars, or I asked you to go to Geneva next week and gave you a million dollars, you can get the necessary passports, drop your business, and you may do it. If I asked you to go to the moon tomorrow and gave you a million dollars, or gave you a hundred million dollars, you would be hard pressed.

I think this is what we are talking about with the pulp and paper industry. The degree becomes a question of kind, where we do not want to be in a position of asking anyone to do the impossible. This is the point.

May we call on the City of Belfast, please?

## STATEMENT OF THE HONORABLE GRIDLEY W. TARBELL, MAYOR, CITY OF BELFAST, MAINE

MAYOR TARBELL: Mr. Chairman, Conferees, Ladies and Gentlemen:

I am Gridley W. Tarbell, Mayor of the City of Belfast.

We do have an identifiable disease and we have a problem of how we are going to cure it.

The City of Belfast welcomes this conference and heartily supports its objective of eliminating pollution in the Penobscot Bay area. We are well aware of the economic benefits to be derived from the restoration of shellfish harvesting and the creation of a healthy and appealing environment for recreational and commercial purposes.

For the past three years, with the assistance of our Planning Board and our Consulting Engineers (Metcalf & Eddy) we have been trying to find an acceptable technical solution and one within our financial means for construction and operation. Naturally, we cannot disregard the cost to our home owners, commercial establishments, and industries as tax-paying supporters of our community.

Therefore, it is most disturbing to us to find a recommendation in the report of the Department of the Interior for secondary treatment, when we have reason to believe that primary treatment would be an adequate solution. The excessive cost for construction of secondary treatment is only part of the burden. The excessive cost for operation of secondary treatment is even more distressing for it is a far greater portion of the estimated annual cost.

Our engineers have prepared a statement which supplements the two reports they have made for us, and of which you have copies. They would now like to present that statement to you.

MR. STEIN: Thank you.

## STATEMENT OF GEORGE TOZER, PROJECT ENGINEER, METCALF & EDDY, ENGINEERS FOR THE CITY OF BELFAST, MAINE

MR. TOZER: Mr. Chairman, Conferees, Ladies and Gentlemen:

I am George Tozer, Project Engineer for Metcalf & Eddy, engineers for the City of Belfast.

On behalf of (our client) the City of Belfast, we present the following statements for the record and your consideration:

1. The City of Belfast has recognized the problem of pollution in Belfast Bay and has taken steps aimed at abating the pollution.

2. Our firm prepared an engineering report dated January 12, 1966, for the City of Belfast in which we cited the restoration of the commercial, recreational, and esthetic value of Belfast Bay as a desirable objective for the city and recommended means to bring this about.

3. The water quality standards on which our recommendations were based are essentially the same as those defined in the report under discussion today. The means proposed for meeting these standards was primary treatment with disinfection, and discharge of the effluent through a submerged outfall extending into the bay. In addition, facilities for the effective removal of grease originating at the poultry processing plants were included.

4. Later we were asked by the City of Belfast to give an opinion on the necessity of providing secondary treatment and to prepare a report on secondary treatment and the costs involved. In our second report to the city, dated February 10, 1967, we stated our belief that primary treatment with disinfection for Belfast's wastes is consistent with raising the water quality of Belfast Bay to the highest

practicable degree.

5. We have reviewed the report of the Department of the Interior and have noted the recommendation for secondary treatment of Belfast's wastes. We do not find in the report any engineering justification for this recommendation.

6. It has been our recommendation to the City of Belfast that Belfast seek approval to install a plant to provide primary treatment and effective chlorination of its wastes with provision for the later addition of secondary treatment. We recommend to this conference that such approval be granted with the understanding, that if and when it is shown that the initial treatment is not meeting the approved standards, immediate action will be taken by the city to add secondary treatment.

Thank you.

MR. STEIN: Any comments or questions?

MR. KLASHMAN: No, I have none.

MR. STEIN: What are we asking for standards?

MR. KLASHMAN: Everywhere we are asking secondary treatment, unless the water use to be protected can be protected with a lesser degree. It is then up to the State. I believe the State is asking the communities involved to prove that in their cases the water use can be proved.

I think, rather than the engineering data from us, I would like to have the engineering data from Metcalf & Eddy.

MR. TOZER: We have our reports. We had two reports and both copies of your reports.

MR. STEIN: As far as I see the issue, and I think you may have stated it well, you have an identifiable disease.

The point is the standard of treatment that we are getting in all the cities in the country today, as we get the population increase, is secondary treatment.

Here you have the City of Belfast and all of your cities along here. Now, I come here very often when I am not on business too. There is one reason you come to Maine. That is because you have clean water, and you also have tremendously prolific shellfish, game and fishing.

It seems to me that if anyone were talking about getting a variance from the usual American package that we are getting into and putting in secondary treatment, it would not be a Maine city in an area that is based on clean water. This kind of argument to me -- maybe there is a point, but with the setting of the standards, this will have to be documented, and Mr. Klashman asked this, be presented to the Secretary of the Interior.

Let me say this to Metcalf & Eddy and to the cities here. I don't think I can give you any encouragement on the notion that the Federal standards which are going to be set, or the requirements that we are going to have, are going to be primary treatment, particularly when they are in a recreational area, in a really clean water area, such as you have in Maine, and in a shellfish area.

I may be wrong on this, but if I am, I think the case will have to be well documented.

Again, we try to arrive at as accurate and as candid a statement of the issues as we can.

MR. TOZER: We do have set up some standards for the quality of water, and we say we can meet them with primary treatment. We do not see the need of secondary treatment at an additional burden of $800,000.

MR. KLASHMAN: Mr. Tozer --

MR. TOZER: Yes, sir.

MR. KLASHMAN: In our standards, as you very well know, the criteria are based on an organism which is a tracer organism, namely, coliform.

Can you tell me what work you have to show what you are going to do with viruses? I mean, what is going to happen to the viruses?

MR. TOZER: We know very little about viruses, but again, this was not one of the qualifications that you set up for the water.

MR. KLASHMAN: No, but the point is we have had problems, as you know, in the Raritan Bay area and other areas with this.

MR. TOZER: Right.

MR. KLASHMAN: One of the things that we are concerned about in secondary treatment is a safety factor.

MR. TOZER: Yes.

MR. KLASHMAN: And, as you very well know, there is work which has been done. Mr. Geldreich may be able to talk more to this, on what primary chlorination is going to do with viruses, and what secondary plants will do.

MR. TOZER: Well, you know our position is that we would like to put in primary with provisions for secondary.

Then we can go out and sample and see if we do have a problem with viruses, and also, there may be other methods for treating viruses; whereas spending $800,000 for secondary treatment, conceivably this could go into some research or some other methods for treating viruses.

MR. STEIN: Here is the problem: When we run a milk plant and we run a water treatment plant, we put in all kinds of safeguards.

Here we are getting something really sensitive and we are talking about a shellfish industry. We have the people in Maine who are going to open the beds. All you have to do is get an outbreak of hepatitis, as we had in Raritan Bay, and that threw the clam sales down to one-third of what they were before for a considerable time, until the industry recovered.

Now, maybe I am missing something. If we put in safeguards for milk for our children, if we put in safeguards when we turn the water on on the tap, what is this business about putting out the wastes into shellfish waters, shellfish growing waters, and deciding that if we need extra treatment later on we will put it in?

I kind of get a little puzzled on it.

MR. TOZER: I think we are in an area that at least we know a little bit.

We do agree that secondary will remove more viruses, but how much is "more"? How much is necessary? Should we go for a whole basket with $800,000 just to have proof positive?

MR. STEIN: Well, we do it. When you are dealing with an organism like a shellfish, and again this is what we are dealing with here and why we are here, you eat it raw, digestive system and all. The shellfish people in the Public Health Service and the State demand the highest requirements. I would guess that the kinds of requirements you would demand in the shellfish are the same kinds of safeguards you would demand in a drinking water supply in a city, or in a milk supply. When we don't do this, it seems to me it goes contrary to the notion of what we are trying to protect.

This is your economic factor, and I am talking from the pocketbook to the people here. Your biggest asset, as I say, to a man from outside the State, is clean water.

I know what all of you look like. I do too. When you go into the office every day and you have to make an appearance, you take a shower every day, whether we need it or not, and it seems to me that when you are a clean-water State attracting people with clean water, and this is one of the uses in addition to shellfish, that the kind of standard treatment which has become standard treatment in all cities is secondary treatment, and is one that is not too much to expect.

MR. KLASHMAN: Mr. Tozer, the reason I am raising this question is that in the statement by Mr. Tarbell, he talked about costs of construction and costs of operation.

MR. TOZER: Yes.

MR. KLASHMAN: He talks about excessive costs of operation of a secondary treatment plant over primary.

Can you give us some idea of the differences in cost, taking into consideration the large amount of chlorine which I understand you plan to put in with a primary treatment plant?

MR. TOZER: Well, I can't give you the cost of the chlorine. I can give you the cost of primary to secondary.

MR. KLASHMAN: I am talking about operation too.

MR. TOZER: Operation, I believe it is around $45,000 operating cost to go from primary to secondary per year.

MR. KLASHMAN: What does the primary stand now?

MR. TOZER: The operating?

MR. KLASHMAN: Yes.

MR. TOZER: I don't have --

MR. STEIN: You mean $45,000 a year difference?

MR. TOZER: Yes.

MR. STEIN: How many people are there in the city?

MR. TOZER: Well, it isn't the city; it is the nature of the wastes.

MR. STEIN: But what is the per capita cost here?

MR. TOZER: These are all --

MR. KLASHMAN: The point that I am trying to get at is, it seems to me you are going to have people operating the plant.

MR. TOZER: Yes.

MR. KLASHMAN: Are you saying that you are going to have more people to operate the secondary plant?

MR. TOZER: Yes.

MR. KLASHMAN: And that this is going to far outweigh the excess chlorine that you are going to have to put in with the primary?

MR. TOZER: I would think so. I don't know.

MR. KLASHMAN: I question this.

MR. TOZER: We have projected all our costs in the report.

MR. STEIN: How much is it going to cost per capita, every person in the City of Belfast?

MR. THOMAS JESTER: To answer the question on chlorination, the report was done on the presumption that the Maplewood people would be in with the city; and to answer your question on the difference between operating costs between primary and secondary treatment, it is approximately $70,000 a year. The additional cost to chlorinate to 50 parts per million, which is a pretty unheard of amount, was approximately $12,000 a year.

Now, that is the difference.

MR. KLASHMAN: Do you want to give us some idea of what you are talking about? You are talking about with the number of people in the secondary plant?

MR. JESTER: The differences in the secondary plant are (1) the people----

MR. KLASHMAN: Yes.

MR. JESTER: It takes a more highly qualified and more knowledgeable staff to run an activated sludge plant.

MR. KLASHMAN: Tell us what you had in mind for $70,000 extra.

MR. JESTER: It was both personnel and the power cost involved in running an activated sludge plant.

MR. STEIN: What would that cost each family a year in Belfast?

MR. JESTER: Well, sir, you seem to be concerned with what it would cost the people.

The fact is that it will cost considerably more money, and the point is that there is considerable doubt as to whether it is needed.

Now, how much the amount is is in the book, and I don't have all the numbers committed to memory. I can't help you.

MR. STEIN: Don't you have your book with you?

MR. JESTER: Certainly we do.

MR. STEIN: Why don't you look it up and let me know.

If it is going to cost everyone the equivalent of a pack of cigarettes a week, maybe it might be worth it.

MR. KLASHMAN: Why don't you give us the figures?

MR. STEIN: Let's go on while you are looking that up.

Are there any further comments or questions?

MR. KLASHMAN: Thank you very much.

MR. STEIN: Thank you.

May we have the Town of Bucksport, please?

MR. KLASHMAN: Do you want to look up the cost per capita for primary and secondary?

MR. STEIN: May we have the Town of Bucksport, please?

## STATEMENT OF ARCHIE D. SANBORN, TOWN MANAGER, BUCKSPORT, MAINE

MR. SANBORN: Mr. Chairman, Conferees, Ladies and Gentlemen:

I am Archie Sanborn, Town Manager of Bucksport.

I am not wholly conversant with all the technical data contained in the report that triggered this conference, but I must agree with the diagnosis and the prescribed treatment, since I seem to have no alternative.

(Laughter.)

First, on the proposed time limit, the Town of Bucksport is well aware of its responsibility in the efforts being made toward pollution abatement in the Penobscot River and the upper Penobscot Bay area. As a result, the town has taken the initial step in its approach to the problem by having engaged the services of a consulting engineer who has submitted our application to H.U.D. for funds with which to complete a preliminary survey. We are stalled at this point, however, since funds from that agency, and for that purpose, are not currently available, and we have been advised that they will not be available within the next fifteen months, if ever. This advisory was from Mr. Trentacosti's office. Furthermore, we have no definite assurance that engineering and construction funds will be available when requested, and for the town to attempt to finance such an undertaking on its own is a sheer impossibility, of course.

I would like to digress a moment from this statement to say that regardless of what the ultimate Government and Federal funds and State funds together might be, and if we had a written guarantee that they will become available, the Town of Bucksport does not have the credit available and their debt limit is not high enough that they could possibly finance it on their own.

It seems only logical for us to assume that the apparent urgency of the particular problem being discussed here today must make the allocation of funds equally urgent.

Any target date that we are required to meet must be accompanied by the timely availability of funds if that target date is to be realistic and meaningful.

The St. Regis Paper Company officials are equally concerned with this pollution problem and have been most cooperative in their efforts to assist us in finding a common solution through consultations, conferences, representation at numerous meetings through the State, and their own testing and research within the Bucksport plant. In addition, they are considering a loan to the town for the purpose of a preliminary survey, in order to expedite that phase of the program. The town's decision to proceed with money borrowed at interest-bearing rates will be carefully weighed against the possibility that engineering and construction funds may be so long delayed that we will be left holding the bag, with a well prepared feasibility report and nowhere to go with it. To sum up, it would seem that timely funding is imperative in implementing this entire program. Lip service alone will not build sewage treatment plants.

Thank you.

MR. STEIN: Thank you.

Can't you get revenue bonds?

MR. SANBORN: In order to get revenue bonds, I wouldn't know where to go to get them.

Until the legislature and the Supreme Court have determined that these revenue bonds are legal and acceptable, it is practically impossible to get revenue bonds.

The financial institutions today are very reluctant to go along with this revenue bonding of sewage treatment plants. That is the last information I have had.

MR. KLASHMAN: In Maine, that is apparently a problem.

MR. SANBORN: Quite a study of this has been made, and on the basis of the reports on the legislation that is being presented.

MR. KLASHMAN: Is Mr. Bonkoski still here, the H.U.D. man who spoke this morning?

(No response.)

MR. KLASHMAN: Did H.U.D. actually tell you that your application would take fifteen months?

MR. SANBORN: This is almost verbatim what he said. Our engineer has his letter that came in with the application forms. He said that funds for this purpose would not be available before July 1, 1968, and there would be no assurance when, if ever, they were available.

MR. KLASHMAN: That was for a plant?

MR. SANBORN: That was a survey, a feasibility study.

MR. KLASHMAN: Thank you.

MR. STEIN: What do you think a reasonable time schedule would be for you?

MR. SANBORN: Well, at a meeting of the legislative committee of the Maine Municipal Association two months ago, we were pretty much in agreement on a minimum of ten years, and that, of course, had to do with the overall pollution problem all over the State.

This here, as I understand, is something a little more pressing.

MR. STEIN: I think you had one problem up here on these revenue bonds, and this is something that you may want to look into.

In most cities in the country, revenue bonds for waste treatment facilities are very easily marketable at about the lowest rate of any of the municipals. That is, you put in a waste treatment plant and you charge each one who is being served a service tax.

The reason that is so is that possibly, even more than real estate taxes, the payments on these come in on a regular basis. The reason they come in that way is that they are generally hooked to a water charge, and if a man doesn't pay his bill, his water gets shut off. You are pretty sure that the money comes in.

A.D. Sanborn

In the New England area, for historical reasons - - and I am not arguing with your history, but this is something you have to face -- you largely have in many cases private water companies, where you don't do this and can't do this.

The suggestion again is that because of what you are faced with here, you have a lot more difficulty in putting forward a revenue bond for waste treatment, and in many cases you may have to pay a higher rate of interest than in the other areas of the country.

New England is way, way behind on this. This is, I think, a generalized problem and it does not just relate to Maine, but this is one of the big problems in water pollution control.

Now, I love your history, and I love to come up to New England. But I think the kind of public financing we do has to be possibly looked into and reconsidered by the people here. The kind of problem that you present, I don't doubt that it is a real one for the Town of Bucksport, but we would never get it presented to us from a town of comparable size and prosperity. I ate in Bucksport last night. We just took one wrong turn.

In a comparable town of that size and prosperity, if you found it in Utah or in Ohio, they would never raise this problem that you have up here. I think this is something that you have to look into, because history may bequeath you something other than benefits.

By the way, I recognize your problem. This is a very real one.

MR. SANBORN: This particular engineering study estimated $6,800,000, which it is our contention would be impossible for the Town of Bucksport, because with a 100 percent valuation, their debt limit or their borrowing limit would be not much more than half of that on a general obligation bond. In this area, the revenue bonds on sewers and sewer wastes, as you pointed out, with the water company, if you don't pay you shut it off, but with sewers, what do you do? Plug up their sewers?

MR. STEIN: You can't do that. That is the point. This is precisely the point, but I do think that as a general thing, what I am talking about is the kind of future financing that you are going to have to do.

It may be wise to take a hard look at this problem, because I think you are in a strait-jacket, in giving yourselves the flexibility of moving that cities in other areas of the country don't find themselves in because of this.

MR. SANBORN: That is true.

MR. STEIN: Yes.

MR. SANBORN: And it is a problem that has not been dealt with very much prior to this.

I was hoping the man from H.U.D. would be here, because I understood him to say this morning, or he gave me the impression that because of the urgency of this, there will be funds available up to 50 percent. I should like to talk with him on that.

MR. STEIN: As I understand their program, if you take one of these advance planning operations, you can get it and you don't have to pay it back until you begin constructing.

MR. SANBORN: My problem is how to even get it.

(Laughter.)

MR. STEIN: Sir, we have heard that from every mayor in the country.

We will do what we can to help you with that, and work with you on that. Of course, this is a two-way street. You have to cooperate, but we are as anxious for you to get it as you are to have it.

MR. SANBORN: What we have come up against is that it is a two-way street, but it is also a dead-end street. So far it is a dead end, because we can't get the money.

MR. KLASHMAN: I have no further questions.

MR. STEIN: Thank you.

Do you have the figures, Mr. Jester?

MR. JESTER: I have the figures now.

MR. KLASHMAN: May I suggest you come up?

MR. JESTER: My name is Tom Jester from Metcalf & Eddy.

In our February 1967 report, facilities of proposed areas, which includes the wastes for the City of Belfast and the Maplewood Packing Company, to answer your specific question, secondary treatment would cost, including 4,000 individuals in Belfast, $34 per year per capita. Primary treatment would cost $19 per year per capita, the difference being $15 per year per capita, or, for a family, $436.

Now, part of this might or might not --

MR. KLASHMAN: Excuse me. The difference would be $60?

MR. JESTER: $15 a year.

MR. KLASHMAN: Per capita?

MR. JESTER: Per capita.

MR. KLASHMAN: The difference would be $60 for a family of four?

MR. JESTER: That is the difference.

MR. KLASHMAN: Yes.

MR. JESTER: But they don't have to pay the difference; they have to pay the total amount.

MR. KLASHMAN: Yes, I understand that.

MR. JESTER: Now, a part of this presumably might be borne by the Maplewood Poultry Company, but certainly somebody would have to pay that too.

MR. KLASHMAN: This puts the entire burden on the people, the way you put it.

MR. JESTER: That is right.

MR. KLASHMAN: How much of the load was the poultry plant?

MR. JESTER: How much of the load?

MR. KLASHMAN: Yes.

MR. JESTER: On what basis?

MR. KLASHMAN: P. E. What other basis is there? Population equivalents.

MR. JESTER: Most population equivalents for BOD are not the same as it is for flow. It is not the same as it is for suspended solids.

MR. KLASHMAN: You must have developed some figures on how you were going to propose charging them.

MR. JESTER: Well, we developed two different methods of doing the charge -- well, there are three methods proposed:

1. The city picks up the tab;
2. The industry pays the added costs; or
3. Based on the various pollutants and their

effect on the cost of the treatment, prorating these into the costs, and we would come up with what might be a fair cost.

MR. KLASHMAN: Could we just know what percent of the load is the industry's based on population equivalent and flow?

MR. JESTER: The industry accounts for about 8 tenths of an MGD and the city about 4 tenths of an MGD, which would be about a 2 to 1 ratio.

MR. KLASHMAN: In other words, the industry is twice as much?

MR. JESTER: On a volume basis.

MR. KLASHMAN: Two to one. The industry is twice as much as the community?

MR. JESTER: That is correct.

MR. KLASHMAN: And on the population equivalents?

MR. JESTER: It would be the same.

MR. KLASHMAN: The same. So, in other words, really we are not talking then about -- what was that figure you had?

MR. JESTER: Which figure?

MR. KLASHMAN: The per capita cost.

MR. JESTER: $34 a year total for secondary.

MR. KLASHMAN: Really, we are not talking about $34 then. We are talking about a third of that. Right? We are talking about $12?

MR. JESTER: If you assumed that the industry is going to pay proportionately, that is correct.

MR. KLASHMAN: Well, there is no other way of figuring it, is there?

MR. JESTER: Well, that is a matter for the city to decide.

MR. KLASHMAN: The point is if you were figuring on $12, a family of four would be figuring a price of $48.

MR. JESTER: The point is --

MR. KLASHMAN: I just wanted to make sure we understood approximately how much money we were talking about.

MR. JESTER: There is another number in here I don't think we have brought in.

There is one number you are failing to consider, and this is 70 percent Federal and State aid on the total project. That has to be paid by somebody also.

MR. KLASHMAN: I am aware of that, but the issue that we were raising was a question of the operating costs, and the operating costs, as I understand it, would be $50 per year for a family of four for secondary treatment, assuming that the industry pays their cost. Isn't that correct?

MR. JESTER: It is wrong.

MR. KLASHMAN: Assuming that the individuals pay only their share and the industry pays its share, then it is two to one.

MR. JESTER: I am not prepared to keep up with you in mental gymnastics with figures.

Your point is obviously that it is not very much money, that the added cost perhaps justifies it.

MR. KLASHMAN: No, I am not trying to say that at all. I am just trying to get the record straight. That's all. I just want to make sure.

MR. JESTER: Well, I think --

MR. KLASHMAN: I don't mean to engage in mental gymnastics with you.

The statement was made that the cost of operation of the secondary treatment plant was, and the idea I got, though the word was not used, astronomical.

MR. JESTER: I think it was something like $70,000 a year, I believe.

MR. KLASHMAN: But the point is that when the industry pays its share and this load is divided up among the people in the town, it would cost them for an operating cost about $50 per family of four people for secondary treatment. Isn't that correct?

MR. JESTER: I don't recall that. Certainly, with the industry paying their share, whatever their share might be, you divide the $70,000 up, and you could make it maybe 20 or $25,000 by the city, which divided by 4 is $4,000, and leaves $15 or $5 per capita, and the difference or the additional cost may be only $20.

MR. STEIN: But the point is, as you pointed out -- and I think this is a fair statement -- that if the industry were not there the cost of secondary treatment per capita would be much more.

Given that industry is there, and we like to see the industry there, we have several factors operating on the costs. One is you are going to have a State grant; secondly, you are going to have a Federal grant; and, thirdly, you are going to have an industry contribution. The poultry industry may contribute a part. Somebody is going to have to pay for it, but wherever these chickens may all come home to roost, they are not necessarily going to come home to roost on the citizens of the community. They may come home somewhere else.

Therefore, the additional cost of secondary treatment per capita for a citizen of the community may not be that much.

Is that correct?

MR. JESTER: Your point is to reduce the cost and spread it around. Our point originally was that we do not see the justification for the secondary treatment, and the fact is that it will cost somebody, whether it is the chicken people or the City of Belfast, or me when I pay my tax bill. The point is it is going to cost somebody more, and if it is not justified, if ther is not a need for it, then why spend the money?

MR. STEIN: That is a very good point, but again I think we have to recognize that it is obvious that secondary treatment is always going to cost more than primary treatment.

The notion that you must grasp here is that if we are talking in terms of the poultry plant and the cities and talking in terms of 85 percent reduction for the tremendous pulp and paper mills, we are talking in the ball park of secondary treatment for everybody. We are talking in terms of equity and trying to get these waters as clean as possible. If those are the ground rules, then we are going to do one thing.

Let me make this point clear to the people here. We have three possibilities. The first is to do nothing at all. The next is that we are not going to push an industry to do the impossible, but as far as I understood this, with the kind of response we got from Penobscot Poultry and Maplewood, and the kind of response we got from both of the big pulp and paper industries, it is certainly within the scope of secondary treatment as equated to industrial wastes.

If we are going to preserve these waters, and the projections are here, if we do not have this kind of treatment for the municipalities, we are going to have to take another look at the cities, because I don't see the point in getting the poultry companies or the pulp and paper companies to provide secondary treatment when the cities don't come across either.

This is either going to be a joint enterprise and you are going to do this equitably and we are going to have clean waters, or we are going to have a lot worse waters; but it does seem to me that in the kind of ball park we are considering, the case for secondary treatment has been made on the basis of the facts of the equities of the case.

Next is Mr. Crommett of Standard. Standard has already testified.

Is there anyone else from Standard?

(No response.)

MR. STEIN: May we now call on Mr. Stevens, the City Manager of Brewer?

## STATEMENT OF EARLE D. STEVENS, CITY MANAGER, CITY OF BREWER, MAINE

MR. STEVENS: Mr. Chairman, Conferees, Ladies and Gentlemen:

The City of Brewer is a city of over 10,000 population, of which about 9,000 are served by public sewers which discharge untreated sewage to the river. The central city currently uses combined sewers, although no new combined sewers are being constructed. A preliminary sewer study was completed in 1964 which considered only city sewerage. The city is now engaged in another preliminary study to consider the feasibility of joint treatment of sanitary sewerage with waste water from the Standard Packaging Corporation. This study will be completed in late summer and the city expects to proceed promptly with final plans and specifications.

The City of Brewer is in accord with the objectives set forth on Page 7 of the report on Pollution-Navigable Waters of the Penobscot River and Upper Penobscot Bay and their Tributaries, dated February 1967, prepared by the Federal Water Pollution Control Administration relative to the proposed uses of the waters of the Penobscot River from the Bangor Dam to Verona Island. We do not agree with the water quality requirements set forth in Table 3 of this report, as we do not feel that it is possible to maintain a concentration of coliform bacteria to a level less than a weekly arithmetic average of 5,000 MPN per 100 ml as recommended; and, furthermore, we are not certain if it would be possible to limit the true color to 30 units or less, not because of pollution discharge, but because natural color of the water may at certain times exceed this reading.

The report recommends that the City of Brewer provide secondary treatment for all dry weather waste, plus disinfection to reduce the density of coliform bacteria to less than 5,000 MPN per 100 ml before dilution. The city does not consider it necessary to provide secondary treatment in order to comply with the water quality requirements for the reach of the river into which it would be discharging its treated waste. The report further recommended separation of sanitary waste from combined sewers, or adequate treatment including disinfection of all overflows from combined sewers. The city does not consider it to be feasible to disinfect storm overflows of combined sewers under present circumstances.

The city does consider that all available funds for the purpose of preventing possible pollution from combined sewer overflows should be used for a permanent solution to the problem as provided by separation. A program of the separation will be carried out by the city as rapidly as the funds become available after the required sanitary treatment works have been placed into operation.

Today's conference was apparently called because of clam-flat pollution. It is our opinion that even if every city, town and industry were to comply with the requirements of the report relative to disinfection of their effluent tomorrow, it does not necessarily follow that the clam flat will then comply with the bacterial requirements of water suitable for clamming. The city contends that due to the general population density of the area and because of possible aftergrowths in the waste water discharge that it may not be possible to limit the coliform concentration to 70 MPN per ml over the clam flats. The above opinion, however, should not be construed to mean that the city is opposed to chlorination of treatment effluents. The city strongly favors the chlorination of all sewage plant effluents as a public health measure.

The proposed scheduling of pollution abatement is of great concern to us. It is the opinion of the city that the scheduling of pollution abatement facilities recommended in the report might be feasible with exception of the period allowed for construction of the required treatment works. Because of difficulties of construction and because of the limited construction season in the Brewer area, a period of 18 months is totally inadequate for the completion of a major construction program such as is contemplated by the facilities which will be required. The city considers the schedule proposed by the Maine Water Improvement Commission to be more realistic in this respect. Much of the timing for the abatement of the pollution will be dependent, however, upon the availability of funds from the State and Federal Government. The city proposes to move forward as rapidly as these funds become available. Crash programs, as apparently recommended in the report, always result in greatly increased cost and often produce less satisfactory facilities than can be achieved through a more orderly process.

The principal industry of Brewer is the Eastern Fine Paper and Pulp Division of Standard Packaging Corporation, which discharges its waste waters untreated directly to the river. The city is greatly concerned about the requirements which are proposed to apply to these waste waters. The city is concerned that these requirements may necessitate the discontinuation of a portion, or perhaps all, of the operations of Standard Packaging Corporation in Brewer, resulting in the possible loss of from 175 to over 700 jobs in our city. This concern stems from the high estimated cost of providing the necessary treatment facilities to meet the proposed effluent requirements if in fact those requirements could technically be met. The city will take all possible action on its part to assist Standard Packaging Corporation to comply with feasible effluent requirements. The city's ability to be of assistance does, however, have a limit. The city proposes to seek all sources of State and Federal aid to assist in meeting the cost of providing the needed treatment works, and much of the progress which will be achieved depends upon the availability of these funds.

In summary, let me clearly state that:

1. The City of Brewer agrees that there is a pollution problem in the Penobscot River and upper Penobscot Bay.

2. The City of Brewer agrees that anti-pollution measures should be taken.

3. The City of Brewer cannot agree with the degree of treatment recommended in the report.

4. The City of Brewer does not agree that chlorination should be required of the storm overflow of combined sewers.

5. The City of Brewer does not agree with the time limits recommended by the report.

6. If Federal and State participation funds are readily available and if a reasonable time schedule is maintained, and if a feasible degree of treatment is required, the City of Brewer will proceed with prompt and orderly installation of its pollution control facilities.

Thank you.

MR. STEIN: Thank you, Mr. Stevens.

Are there any comments or questions?

(No response.)

MR. STEIN: I just have one. Why did you say it is not possible to reduce the coliform to 5,000?

MR. STEVENS: I must state that this report was prepared in consultation with our consulting engineers and I am not qualified to answer that question.

MR. STEIN: Well, this is just for the record. This is again a little different than what we have gotten from the pulp and paper industry and the other industry.

As far as I know, that is completely possible.

MR. KLASHMAN: Who are your consultants?

MR. STEVENS: Camp, Dresser and McKee.

MR. STEIN: It is just a question of money.

I think you might look at that again. Your other points are very clear and well taken, but I don't think that one quite stands up.

Are there any other comments or questions?

MR. KLASHMAN: No.

MR. STEIN: If not, thank you very much.

John T. Frawley of Bangor, Maine.

## STATEMENT OF JOHN T. FRAWLEY, CITY ENGINEER, CITY OF BANGOR, MAINE

## J. T. Frawley

MR. FRAWLEY: Mr. Chairman, Conferees, Ladies and Gentlemen:

The City of Bangor has had a pollution problem of its own, all of its own, for quite some time now, and it is not really connected directly with the Penobscot River. We have a stream, the Kenduskeag, which flows through the harbor of the city, and it has a much slower flow, of course, than the Penobscot River. It collects about 60 percent of the city's pollution.

In 1963, the city started to take steps to correct the situation. We hired the firm of Metcalf & Eddy, and we received an advance preliminary planning grant to run a study of the pollution abatement program.

In November, I believe, of 1963, the Water Improvement Commission classified the Penobscot River and came up with a recommended classification which would provide SC classification below Bangor in the estuary.

Our report was completed in March of 1964 and was presented to the Water Improvement Commission. This provided for a primary treatment plant and a system of interceptor sewers, with storm water overflows, to intercept from three to four dilutions of our sanitary sewage.

In December of 1965, we received an offer from your Department of a maximum grant of $1,200,000 towards the first phase of construction, which included the primary treatment plant and the Penobscot interceptor plant upstream.

Obviously, through that report, you considered this treatment would be satisfactory.

In July of 1966, final plans were approved by the Water Improvement Commission, and the following month were again approved by your Department.

In October of 1966, you approved the low bid that we received and permitted us to award construction contracts on our treatment plant.

Our criticism that we have after receiving this report is why were not these facts that secondary treatment was necessary, made known some time ago, preferably four years ago, before the Water Improvement Commission classified the river?

Obviously, we have the problem of the shellfish and clam beds. They were closed in 1946, and it has been getting worse, so it certainly was apparent. This is our criticism.

Right now, our first phase representing $4 million is approximately 20 percent complete. This leaves Phase 2, representing about $2 million of the total cost, which provides for the stream interceptor sewer, which the city so desperately needs.

We have been trying for nine months now through discussions with the Water Improvement Commission to have some type of idea when the matching Federal and State funds would be available, so that we could start this second phase.

It will be to our benefit and to the benefit of the Federal and State governments if we could begin this project prior to the demobilization of our contractor, because we can obviously get much more competitive bids with a contractor present and mobilized. It appears that we will not be able to accomplish this, and that the contract will be substantially completed before we can have final plans completed for the second stage, even if we should have the money tomorrow. We have yet received no answer whatsoever as to when any of the money will be available.

On top of this, we have the latest report. There is nothing in this report with respect to the price of clams. It says nothing with respect to the economic burden on the individual communities.

How much is it going to cost any of the industries to perform this much greater treatment? In the case of a municipality, secondary treatment, which we have been assured up until now would not be needed at the present time, and the treatment of storm water overflows or separation of combined sewers, which we have never had an indication would be required, we can only hastily estimate will cost $2 million. Again, we don't know where the money will come from, whether on a local basis or also primarily from the State and Federal basis.

On the question of separation of combined sewers, all of Bangor's sewers, with the exception of perhaps half a dozen, are combined sewers. In fact, we have almost 500,000 feet of combined sewers.

To separate these would mean to install new sanitary sewers on every street in the city. It has been estimated that this would cost seven and a half million dollars.

Now, this could be termed as a construction figure. If you took into consideration all of the other costs that would be involved by the utility companies and probably the necessary relocation of existing utilities by the home owners in reconnecting their roof drains into the storm lines and separating their sewage, then it would be very hazardous to make a guess.

As it boils down, instead of the $6 million with the understanding that some time in the next twenty years. we would probably have to go to secondary treatment, as we had been led to believe, we now have a project that will amount to between 15 and $20 million.

Obviously, I think it goes without saying, that we protest this. We don't know where the money is going to come from, our local share, and we don't really know where it is going to come from on the Federal-State side.

With regard to the time schedule, it was recommended that all preliminary plans be completed within eight months. The actual working time on the Metcalf & Eddy report for our first preliminary plan was about six and a half months. We received an advanced planning grant from H.U.D., and it took us a year and a half, so that the actual time for the presentation of our preliminary planning report was in excess of a year and a half. So, obviously, anyone wishing to take advantage of that program could never meet the deadline.

The report also recommends 18 months for submission of final plans. Assuming by some miracle that the preliminary plan was submitted within eight months, this leaves ten months for final plans.

Metcalf & Eddy has assured us that merely to complete the Phase 2 plans, which is the interceptor sewers that cost $2 million, will take a year, so if you add the separation of sewers on top of that, which means surveys throughout the entire city and secondary tretment, it would be hard to give you a realistic estimate.

Some communities are going to go into the separation of sewers. We are certainly going to do so whenever we can do it, and whenever we have to replace a sewer we try to separate, and we are installing no more combined sewers, and have not, for some time.

The District of Columbia has taken the separation program, I understand.

MR. STEIN: Yes.

MR. FRAWLEY: I also understand it is about a $2 million program, and they expect to be about a third complete by the year 2000, whereas we have 18 months.

MR. STEIN: By the way, the District of Columbia, for your information, has put in a $75 million interceptor, which is alleviating the storm water overflow to a slight percent.

The rest of the program is being done over this long period of time. Their biggest interceptor is going to be in place next year.

The reason we did that is with the rush of this program, we would not have been able to get an automobile through the District for the next fifteen years, so this long-term program was established. However, by and large, the storm water program is going to be licked in the District, and they have put in $75 million to do it.

MR. KLASHMAN: Did I understand that you are talking about the preparation of preliminary plans for storm water overflows for combined sewers being completed within a certain date, or are you talking about actually having the works?

MR. FRAWLEY: To begin with, you say eight months for our preliminary plans.

MR. KLASHMAN: As to what you were going to do about it.

MR. FRAWLEY: That is right.

Now, I am saying that the preliminary plans that we have had so far took us a year and a half, and this amounted to $6 million worth of work.

MR. KLASHMAN: Just sticking to the preparation of the plans for what you would have to do on the storm water?

MR. FRAWLEY: Yes, preliminary plans.

MR. KLASHMAN: When do you think you might be able to get that?

MR. FRAWLEY: Well, I really have no way of estimating it, because certainly every street in the city has to be considered individually.

MR. KLASHMAN: That isn't necessarily so.

MR. STEIN: Let's take the secondary treatment. How much should it cost you for secondary treatment?

MR. FRAWLEY: We figure $2 million.

MR. STEIN: $2 million. You say it takes a year and a half for preliminary plans?

MR. FRAWLEY: I don't know. I am just telling you what it took us before.

MR. STEIN: Yes.

MR. FRAWLEY: I said that it took us actually a little over six months for our preliminary report, but because we have applied for this H.U.D. advanced grant and did a lot of paper work and we had to wait for approval, and so forth.

MR. STEIN: I understand that, but, you know, H.U.D. has been here today. They were just formed a couple of years ago. They are running a much more rapid operation now. This is a different division.

However, it took you six months for your plans. Metcalf & Eddy say a year. Let's suppose you should be ready to go, aside from storm waters, in two years, if you were going into a secondary plant alone.

MR. FRAWLEY: Disregarding storm waters?

MR. STEIN: Yes, disregarding the storm waters.

MR. FRAWLEY: With no interruptions, we would probably have a preliminary report in six months, and probably have final plans in two years.

MR. STEIN: Right.

MR. FRAWLEY: Except, remember, we also had final plans in the second phase of just the existing interceptor. This will eliminate much more pollution than the secondary ever will, because this takes care of about 60 percent of raw sewage that is being discharged right now.

MR. KLASHMAN: You know, I would like to correct something that there apparently is some misconception about that you had in the report that was given.

You are making a judgment that we have said that you must separate your storm water and this is a plan we are talking about. We did not say any such thing.

MR. FRAWLEY: Well, I had not finished when you started questioning me.

MR. KLASHMAN: I'm sorry.

MR. FRAWLEY: We feel that this will disinfect the overflow --

MR. KLASHMAN: The point is, we don't know what you are going to have to do. This is what the report is about. I don't think you can make a judgment at this point. I am sorry.

MR. FRAWLEY: The point is, we have roughly 32 combined sewers discharging into the river or the stream, and I would understand from your requirements that either these would have to be separated or they would have to be disinfected to some extent.

We do not have any firm estimate on disinfection, other than the fact that the condition of the stream is very bad. The only thumbnail lesson we have been able to find from something like this is it costs $1,800 per acre, we read in one of the reports, and we have 4,500 acres to do, so we are talking in terms of somewhere around $9,000.

MR. STEIN: Do you want to change your figures for the record?

MR. FRAWLEY: 4,500 times 1,800.

MR. STEIN: Yes, just for the record.

MR. KLASHMAN: You said $9,000. You didn't mean that.

MR. FRAWLEY: $9 million. I'm sorry.

Well, to summarize this, we do feel that not enough examination has been made of the local burden here and how it is going to affect the community. We also feel that the time schedules are not realistic.

We have some very humble recommendations on how this might be approached. We feel that your agency perhaps with the Water Improvement Commission should permit each community to make preliminary survey of the systems to meet these new requirements -- in other words, for us to be in secondary treatment -- and this would give us an idea of how much it is going to cost, and how we could schedule it so that the city will not go bankrupt.

I don't think that we should have the limiting time this should be in, but I do think we could have a limiting time when it could start. In other words, you should tell us that you have to hire a consultant within three months, or five months, to have a preliminary plan study made, and then generally it is the consultant anyway who will do the estimate of how long he thinks it is going to take to make a study.

Some of the communities might be able to complete the study in two months, some of the small ones, and then we have an indication further again of your money, how your appropriations will run, and this could be staggered. Do you follow me on that?

MR. STEIN: I understand what you are saying.

MR. KLASHMAN: What would be the outside time that it would take for your planning job, the way you are talking about?

MR. FRAWLEY: Well, I have no idea.

MR. STEIN: When do you think it could start?

MR. KLASHMAN: Would that be ten or twenty years?

MR. STEIN: Wait a minute. You said three months. Do you think it is reasonable?

MR. FRAWLEY: Well, that is entirely up to the counsel. I think it is reasonable, yes.

MR. STEIN: You are making the recommenaation?

MR. FRAWLEY: I think that anybody could have a consultant in three months.

MR. STEIN: I am trying to put the recommendation in a form for the conferees. I don't say they would buy it.

Let us suppose that we would meet, say, in three and a half or four months from now. Do you think that all the cities could hire an engineer to indicate to us what they were going to do to meet the new requirements, and then to come up with a notion of when they were going to have this report in?

MR. FRAWLEY: Correct.

MR. STEIN: And, I take it, with the engineer we would expect to get a reasonable report on the kind of job? Is that more or less what your proposal is?

MR. FRAWLEY: That is right. You would have a reasonable cost estimate, and reasonable methods of carrying it out, and a time schedule actually for construction.

MR. STEIN: So we should have, at the end of at least four months from now, statements from each of the communities, and your proposal as to how long it would take to get this in?

MR. FRAWLEY: I think possibly, yes.

MR. STEIN: All right.

MR. FRAWLEY: Then I think the next step, after the preliminary reports are in, each community and perhaps even each industry individually, these people in the Water

Improvement Commission will find out what the results of their report is, what they have got to do, and what is a reasonable schedule to do it, and what are the funds for them to do it.

Now, you mentioned about charging a sewer fee on Water Consumption and this is what we propose to do on our present plan. We feel the treatment now for the average family comes to about $80 a year.

MR. STEIN: Does that include secondary treatment?

MR. FRAWLEY: No. That is just primary treatment. That is the $6 million program.

MR. STEIN: Yes.

MR. FRAWLEY: To do that, we very hastily estimate would probably triple that figure.

MR. STEIN: Triple it? Eliminate the storm water. To provide secondary treatment.

MR. FRAWLEY: Okay. It would increase it by a third.

MR. STEIN: By a third?

MR. KLASHMAN: $80 to provide primary treatment?

MR. FRAWLEY: Yes. I will also say this: This also includes a certain amount for normal maintenance.

MR. KLASHMAN: Does this also include the collection systems, as well as the interceptors?

MR. FRAWLEY: Normal maintnance; yes, sir. As we have worked it out, we think it is going to cost every home owner $80 for everything pertaining to sewage, including maintenance and reasonable extensions.

MR. KLASHMAN: That includes the collection system?

MR. FRAWLEY: Yes.

MR. STEIN: All right. I think your suggestions are very good.

I don't know whether you made this as a point of rhetoric or not, but the approval of the Federal grant for primary treatment does not mean that that meant that was all you needed. The point is that at that time, as long as it was a step in the right direction, they went along with it.

At that point we did not have jurisdiction over the shellfish beds on our own initiative. The law has been changed since then, and that is why we are here.

I think if it were not for the Muskie amendment and you didn't get that primary grant, we wouldn't be here. The reason we are here is because of that. That did not mean that we gave you the promise for whatever followed in the future that we were not going to be back.

MR. FRAWLEY: Thank you.

MR. STEIN: But I think your point of view is well taken, and your suggestions are.

MR. FRAWLEY: Excuse me. May I add this?

MR. STEIN: Surely.

MR. FRAWLEY: Is there any indication when funds will be available for us to continue on our existing program?

MR. KLASHMAN: I don't think that I can answer that.

Let us assume that the $200 million was made available that is in the President's Budget. I don't know when Bangor would get money to go ahead.

The way the Federal law is written, the States set up criteria and set up priorities as to which of the communities are to get the money. This is in the law and we have no control over this, except that we do insist that the criteria under which the communities are judged is a reasonable set of criteria, and an equitable one.

MR. MAC DONALD: It is in the sixth year, and this would comprise last year, so that would mean 1972 for your main work.

MR. FRAWLEY: Thank you.

MR. STEIN: Are there any other comments or questions?

(No response.)

MR. STEIN: If not, thank you very much, Mr. Frawley.

We now have Mr. Robert Ruppert of Carver-Greenfield.

## STATEMENT OF ROBERT W. RUPPERT, DIRECTOR OF ENGINEERING, CARVER-GREENFIELD CORPORATION, SUMMIT, NEW JERSEY

MR. RUPPERT: Mr. Chairman, Conferees and Guests:

This might be considered as a form of a commercial, but I would like to make a statement.

First of all, my name is Robert Ruppert. I am Director of Engineering for the Carver-Greenfield Corporation in Summit, New Jersey.

Our corporation asked me to appear today and to make a brief statement relative to your pollution problems.

Carver-Greenfield Corporation is a subsidiary of Fred S. Carver Incorporated of Summit, New Jersey. One of its primary functions is providing assistance to both government and industry in bringing about efficient solutions to water pollution and waste handling problems by economic recovery or destruction of many waste substances through application of the Carver-Greenfield Process.

This process is an oil-medium dehydration method uniquely adaptable to many waste disposal problems. It yields, in many applications, dry solids and oil (or fat) of marketable value. In cases where recovered solids have no market

R. W. Ruppert

potential, the dry solids are often combustible and capable of furnishing all or most of the heat energy needed to run the process. That is, little or no additional purchased fuel is required to sustain the Carver-Greenfield dehydration process. The raw polluted water entering the process is discharged substantially as distilled water for re-use or safe disposal.

Carver-Greenfield plans are successfully operating on industrial and municipal sewage sludge, animal wastes, fish protein production, and other applications.

Of particular interest to this conference, perhaps, would be the Carver-Greenfield Packing House Waste Facility soon to be erected in Omaha, Nebraska. This plant, the largest to date, will end the tremendous animal grease and solids waste pollution of the Missouri River generated by the huge meat packing industry located there. Your chairman, Mr. Stein, is quite familiar with this problem which has been one of the **Nation's** most formidable. The Carver-Greenfield plant to be constructed in Omaha will intercept from 50,000 to 100,000 pounds per day of grease and solid wastes now entering the river, and will process them into marketable animal feed and tallow products. Returns from the sale of these materials will contribute to paying off the investment cost to the City of Omaha of the total project.

We are quite proud to be playing a significant role in the cleaning up of the Missouri River at Omaha and, in closing, we wish to apprise this conference that we are keenly aware of and are interested in being of any possible help in the pollution problem now facing the Penobscot Bay area.

As an added note, I would like to say this off the record.

(Discussion off the record.)

MR. RUPPERT: Thank you.

MR. STEIN: Thank you.

Are there any questions or comments?

(No response.)

MR. STEIN: If not, thank you very much.

May we have Mr. Levi Grant of Stockton Springs?

## STATEMENT OF LEVI GRANT, STOCKTON SPRINGS, MAINE

MR. GRANT: Mr. Chairman, Conferees, Ladies and Gentlemen:

My name is Levi Grant, and I am from Stockton Springs. I have been asked to speak for the local communities.

We think that the pollution has been a hard blow for everyone, including commercial fishermen and sports fishermen. We feel that the clam digger has been hit harder than anyone else.

Through the years, we had built up a large business, and in 1966, July 1st, the door was shut. We lost that business. That business was taken away from us. The diggers were really hit.

The diggers go as far as 200 miles a day in order to get clams, and sometimes end up with 20 bushels, but we have been obligated to our local buyers and we have to do it.

Now, we feel that we don't want to drive any industry out of business. We know industry dumps a lot of money into these localities, but there is also quite a lot of pollution from them too.

In the shellfish business we are struggling, and we will continue to struggle. We have not asked any favors yet, but now we do have a favor we would like to ask.

We would like to ask a favor that this job of cleaning the water and getting decent waters, getting our rivers and bay cleaned up, be started as soon as possible without waiting for years and years, without doing anything.

Thank you.

MR. STEIN: Thank you.

Are there any comments or questions?

MR. KLASHMAN: No.

MR. STEIN: If not, thank you very much.

I know it is late. This has been our last participant, unless anyone else feels he has something to say.

At this point the conferees will get together.

We will now retire to a room back here and have an announcement in not more than a half an hour, I think. With that, we will recess and we will reconvene here as soon as possible, but not more than a half an hour.

Thank you.

(Whereupon a recess was had.)

MR. STEIN: May we reconvene?

I know this is going to be a happy day. We have just had the chief of our stream studies in the country, Mr. Kittrell, come in. He has been a little under the weather and we are delighted to see him out again. This is the best news I have had for a long time.

Thank you, Kitt.

The conferees, I am pleased to announce, have come to a unanimous conclusion and recommendation.

The conferees find that pollution of the Penobscot River and upper Penobscot Bay and its tributaries in the State of Maine is occurring;

that this pollution results from untreated and inadequately treated municipal and industrial waste sources; that the pollution causes a substantial economic injury which is resulting from the inability to market shellfish or shellfish products in interstate commerce because of this pollution, and this inability comes about because of action of Federal, State or local officials, that the measures taken to abate pollution to date have not been adequate and the delays in abating this pollution have been caused because of the complexity of the problem.

The conferees agree on the water quality requirements set forth in the Federal report. That is, tidal and marine waters in the communities of Northport, Searsport, Stockton Springs, Penobscot, Castine, Islesboro, Belfast east of Goose River and Belfast south of latitude 44 24'N, meet water quality requirements shown in Table I, which will appear here. That means those waters shall be fit for shellfish production, harvesting and marketing in interstate commerce; and the key point on that, or the distinguishing point is that weekly median of coliform of not more than 70.

The tidal and marine waters in Belfast west of Goose River and in Belfast north of latitude 44 24'N, meet water quality requirements shown in Table II. This means that it be suitable for recreation, including water contact sports, and the key point normally used, in addition to the others, of course, which will all appear in the summary, will be coliform bacteria of a weekly arithmetic average of not more than 1,000.

The third point is that the Penobscot River from the Bangor Dam to the southern tip of Verona Island meet water quality requirements shown in Table III. This means water quality suitable for all uses, including recreation, except direct water contact, and that the weekly arithmetic average of the total coliform content be not more than 5,000.

The conferees were impressed by the presentations made by the various parties here, and, in large measure, the force of the arguments and the promise presented by the people influenced the conclusions of the conferees.

The conferees have decided that we will have a meeting or a reconvening of the conference four months from now at the call of the Chairman, and then succeeding progress meetings called at six-month intervals.

At the meeting four months from now, we would expect all the dischargers who appeared today and were named in the report to come up with a time schedule for remedial action.

The two poultry firms will come up with a time schedule, and this will be based on a 90 percent reduction of BOD, 90 percent reduction of solids, and an effluent not to exceed 5,000 coliforms.

All the conferees will have to come up with a schedule and an abatement program to meet the water quality requirements I have indicated above -- that is, the ones we have indicated to be available for shellfish and harvesting and the effluents not to interfere with that, those for water contact sports and those for other water uses, such as recreation not including direct water contact.

The two paper mills will be required to come up with a remedial plan for abatement considering an 85 percent reduction minimum of sulfite waste liquors and adequate reduction of BOD and solids to meet the water quality requirements indicated above.

In order to expedite this, we will also, under the chairmanship of Mr. Pahren, who presented the report, ask that a technical committee be set up consisting of Mr. Pahren of the Regional Office of the Federal Water Pollution Control Administration, Department of the Interior; representatives of the two mills; Mr. **Macdonald**, or a representative of his office; Mr. Eugene Jensen, our shellfish expert, who has for the past several years headed the Federal Government's shellfish certification program and is now working with us; and Mr. Dow of the State.

The object of this committee is to be sure that we can get an industry program which is satisfactory to industry and the shellfish people.

Looking at the preliminary figures in the presentations you have made, and the analysis that Mr. Jensen and others have made, I am very optimistic that we can come up with this program, that you can fit this in in accordance with the problems that the pulp and paper people have set forth, and we can still have the shellfish industry.

In other words, I am certain that we can have both the poultry and paper mill industries here and shellfish.

In addition to this, we will consider, and the committee should consider, the contribution being made in this area from the upstream mills.

Now, you have two points there. If the committee believes the State program has this under control and we don't have to attend to the upstream mills, we will be delighted. If the committee comes in and says, "We are asking you to do something reasonably down here," the two mills, we will also have to consider that they do it.

I hope it will be the former. I hope we will not have to extend the scope of this conference and that the upstream mills can be handled under the State program, and the treatment provided by the two mills here will provide the necessary water quality standards to meet the requirements above.

## Closing Statements

In addition to this, we have listened to the cities' presentations. We are asking the cities to engage consulting engineers where they have not already done so, and, at this meeting four months from now, come up with time schedules for primary and secondary treatment, with appropriate disinfection of the effluent in both cases.

I think we have tried to accommodate everyone.

Are there any other comments?

MR. MAC DONALD: I have none.

MR. KLASHMAN: I have none.

MR. STEIN: I think we have made a great advance here.

We appreciate the industries and others coming forward and giving us the problem.

I do think the key to this is going to be full cooperation in this particular technical committee by the cities and by the industries. In other words, at the next meeting four months from now, at the end of August, we should have the scope of the program.

However, the key for the cooperative program is not going to be based on just the State people and the Federal people. We are going to put our people in there, but it is for the municipalities and the industries here that are going to have to cooperate and come up with their schedules.

## Closing Statements

Our hands are extended to meet you at least halfway, and you have to meet us. If you do, we will, I think, come up with a reasonable and an equitable program.

I might point out here that the conferees have also looked at a letter and an attachment from the Associated Industries of Maine, sent to us by Mr. B. Morton Havey, Executive Director, and a letter sent by Mr. Albert E. Sandecki, concerning this conference.

We have viewed them, and, without objection, I think these should appear in the record as if read.

One of these is from the industry point of view, and the other is the point of view of a clammer, and I think the views expressed in both of these are clearly and succinctly expressed, but in order to save time, I think they echo or reenforce views that we have heard several times today. The conferees did read these and considered these statements.

(The letters and statements referred to are as follows:

ASSOCIATED INDUSTRIES OF MAINE
154 STATE STREET
AUGUSTA, MAINE

B. MORTON HAVEY DIAL 623-4568
EXECUTIVE DIRECTOR

April 19, 1967

Mr. Murray Stein
Federal Water Pollution Control Agency
Department of the Interior
Washington, D. C.

Dear Mr. Stein:

Enclosed please find a statement which has been prepared by Associated Industries of Maine in connection with the forthcoming Conference on the problem of water pollution in Lower Penobscot River and Upper Penobscot Bay, to be held at Belfast, Maine, April 20.

Due to prior commitments, I find that I will be unable to attend the Conference, but would request that this statement be made a part of the official record of the proceedings.

Because of shortage of time, I am taking the liberty of sending a copy of this directly to you at the Belfast Area High School, Belfast, Maine, and an additional copy to Mr. Raeburn W. Macdonald, Chief Engineer, Water Improvement Commission, Augusta, Maine.

Sincerely yours,

/s/ B. Morton Havey
Executive Director

BMH:mm

Enclosure

cc - Mr. Stein at Belfast

cc - Mr. Raeburn W. Macdonald

* * *

ASSOCIATED INDUSTRIES OF MAINE
154 STATE STREET
AUGUSTA, MAINE
B. MORTON HAVEY
EXECUTIVE DIRECTOR DIAL 623-4568

STATEMENT BY ASSOCIATED INDUSTRIES OF MAINE
Conference of Department of Interior
Belfast, Maine, April 20, 1967

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I am B. Morton Havey, Executive Director of the Associated Industries of Maine, an organization of some 230 companies representing the whole spectrum of Maine industry.

I would like to leave with you today a number of considerations which must be taken into account in coming up with a workable pollution abatement program for the Penobscot River and Upper Penobscot Bay.

Maine's classification system has moved forward in an orderly manner with the bill which would classify the last major unclassified water system, the Androscoggin River, now before the Maine legislature. After this session it is anticipated from bills now before the legislature that the long process of establishing water quality standards for all waters over which the State of Maine has jurisdiction will be completed. Perhaps some would find fault with the State for not moving faster but my answer to that is that Maine was moving when many of her sister States had no plans at all for an upgrading program.

The most important aspect to Maine's water clean-up program is that ample time be given to the municipalities and industries to secure competently engineered plans, compatible financing and sound construction of the abatement facilities. In Maine a crash program will not work and may be disastrous.

Obviously, if insufficient time is given to secure competent engineering services, the treatment plant when finally built may not adequately handle the waste load with the result that those who complained and demanded a too rapid program were no better off than before. Also, in addition to the loss of time there might well be a substantial loss in Federal, State and local money before the plant was rebuilt to function properly. Furthermore, some communities and industries are exploring the possibility of building treatment facilities to treat both industrial and municipal waste -- and this type of facility just can't be rushed off the drawing boards.

There must be time to secure financing compatible with the Federal, State, municipal and industrial means and needs.

In facing up to this overall problem, it would seem justifiable that your attention be invited -- as I am sure it must have been on other occasions -- to the fact that industrial management has additional fiscal responsibilities over and above expenditures for internal costs designed to abate pollution. I respectfully suggest that all of us, at least in this northeastern region, must ever bear in mind that in various instances a single company may pay upwards from 50% - 85% of a community's total tax commitment.

Thus it is that industry must assume additional financial burdens as a community's largest taxpayer and in this role must pay the lion's share of municipal pollution abatement costs -- plus meeting internal company obligations.

As we well know, these obligations in the area of dollars are numerous: obligations of a company to its community -- to its employees and their families -- to its stockholders and to its customers.

So that there can be no question as to the vital role that the manufacturing industries have in this State, may I refer you to some late figures from the Maine Employment Security Commission.

In the year 1965, the last year of reporting, over half the wages in covered employment was paid by manufacturing establishments. By way of comparison, $506,804,613 was paid by manufacturing plants, while payments from agriculture, forestry and fisheries combined represented but a small fraction of 1% of this amount -- or in rounded dollars $3,855,165.

Looking at one industry in one limited area of the State, in a report dated April 17, 1967, the Maine Department of Labor and Industry computed that Paper and Allied Products industries located on the Penobscot River and its tributaries employed in 1965 (the last year of reporting) in excess of 4,500 persons with an annual payroll of over $33,000,000. In the last two years the paper mills on the Penobscot River and other rivers in this State have greatly expanded their facilities and created new jobs.

The Clean Waters Restoration Act of 1966 authorized for the fiscal year 1968 Federal grants in the amount of 450 million dollars, of which the State of Maine was to receive $3,118,950. Because of our country's other commitments, as we know, President Johnson recommended an appropriation of only 200 million dollars, reducing by more than half the amount of Federal support which would come to our cities and towns.

***

50 Tanner Street
Haddonfield, New Jersey 08033

18 April 1967

Federal Water Pollution Control Administration
Belfast Area High School
Belfast, Maine

Dear Sirs,

I feel vitally interested in the protection of the clam flats along the shores of the Bagaduce River, as well as the eastern shore of the Penobscot River.

In the past I have pleaded for saving Goose Pond on Cape Rosier in Hancock County, Maine. That pond has now succumbed to the interests of the Callahan Mining Corporation of New York, and their "open pit" copper and zinc mine, through the damming and draining of the pond.

An act that a few others as well as myself were saddened by, but as the majority ruled on the need of the work in the area it was quite unavoidable.

The Callahan Mining Corporation when in full operation in 1968 intends to pump effluent containing mining waste from their flotation process, at the rate of 900 gallons per minute for an unspecified length of time into the Penobscot Bay.

This will doubtless add to your increase of pollution in the river as well as the bay. I am but a summer resident of Harborside, Maine, but feel a deep and abiding love for the natural beauty of your state. To me and many others (summer people) Maine is the last stand for unspoiled beauty.

In my humble opinion what you do or do not do at your conference may have far reaching effect on not only the marine life of your waters but lives of those who say, "I can't wait to get back to Maine."

I ask you to consider some sort of definite legislation to stop or at least control the pumping of still more swill into that still beautiful Penobscot Bay.

I live near the Delaware River in New Jersey, and I would like you to come down and visit here, or better yet spend a summer on its shores. It would make you sick to your stomach.

Here in my estimation is the chance to slam the foot down on this menace of pollution. Is this not what the F.W.P.C.A. desires to do?

Please consider carefully what you do not for my sake or yours rather for your children's. Are you going to leave them a Delaware or a Penobscot.

Sincerely yours,

/s/ Albert E. Sandecki

* * *

50 Tanner Street
Haddonfield
New Jersey 08033
18 April 1967

United States Department of the Interior
Secretary of the Interior
Washington, D. C. 20240

Dear Mr. Udall:

I am writing in reference to the conference in Belfast, Maine mentioned in the enclosed article from the weekly paper.

Sir, I have written to you in the past and your secretaries both, Mr. Tunison and Mr. McDroom have been most courteous in their concern and replies. I know these clam flats you have expressed concern about, my experience is purely an aesthetic and gastronomic one.

I feel vitally interested in the protection of the flats on Ram Island and along the shores of the Bagaduce River, as well as the eastern shore of the Penobscot Bay.

In my past letters of April 8th, 1966, March 24th, 1966, and my first to you on January 13th, 1966, respectively, I have pleaded for a saving of Goose Pond on Cape Rosier, Maine. That has now succumbed to the interests of the Callahan Mining Corporation of New York, and their "open pit" copper mine, through the damming and draining of the pond. An act that I and a few others were saddened by, but as the majority ruled onthe need of the work in the area it was quite unavoidable.

Now there is a proposal by the Callahan firm that is of deep concern, as well as avoidable, or at least should be controlled.

The company intends to pump effluent at the rate of 900 gallons per minute for an unspecified length of time into the Penobscot Bay.

Now, what is the possibility of controlling or stopping this source of pollution? In the past I have been assured that this effluent will be tested and monitored by such agencies as the Water Improvement Commission, etc., etc. This has prompted me to enclose this second newspaper article, concerning loopholes in these laws.

I ask you and your department again, PLEASE help to stop this 900 gallons per minute of mining waste about to be pumped into the Penobscot Bay.

Here in my estimation is the chance to slam the foot down on this menace of pollution, is this not what the F.W.P.C.A. desires to do?

I am writing to the F.W.P.C.A. at their conference in Belfast, Maine this April 20th, expressing in essence the contents of this letter and a copy of my letter to you.

Sincerely yours,

/s/ Albert E. Sandecki

* * *

MR. ROBERT BALDACCI: Mr. Chairman, as far as this four months for planning, the City of Bangor is ready to go. We have been ready to go. Now, this is unusual.

MR. STEIN: No. We understand that. We understand what you are doing. You worked with the State program.

By the way, we take cognizance of all the plans that the industries and cities have put in. What we are asking for is a plan for primary and secondary treatment.

You have another one, and I am glad you brought this up. This may be an extra task, but I don't think we are going to lick the problem without that. I think you should come up with a schedule on the planning of what you are going to do with your combined sewer problem in this four-month period.

Now, the City of Bangor is moving, of course, in the right direction. They are going ahead with primary treatment. What we want to know is your plans for secondary treatment and what you are going to do about stormwater separation at the end of four months. Some of the cities are not as far advanced as you are.

I might say, when we reappear here in four months, our job is going to be to reach the water quality outlined here as nearly as we can. In other words, if you can put something in and clean up or open an area of clam beds, this should be given paramount consideration in all of the planning by the cities, with the understanding that the conferees are going to take this into consideration. You should do your planning absolutely related to water quality objectives.

Again, you have to consider the location of Bangor as related to other cities.

MR. BALDACCI: The only thing that I was looking at, Mr. Chairman, that our first phase will be completed this fall. We have a pumping station that will be pumping hardly anything if the second phase is not completed. It will be pumping a trickle. This is the concern of our city engineer, and has been.

I appreciate the fact that this conference, as I understand it, is interested in planning and cities generating and looking forward to planning here. I am looking for initiation of plans.

MR. STEIN: I am not arguing. Maybe these people can do this.

This is not an unusual problem. We hope that nothing the conference will do will stop the work you are doing.

I would suspect that your problem on pumping that trickle would have existed, whether we had the conference or not, because this deals with construction and money and other phases of the work.

MR. BALDACCI: This is where the realistic part of initiating this plan comes in. Right now the State of Maine is participating.

MR. STEIN: Right.

MR. BALDACCI: And at 25 percent, and I understand Governor Curtis had mentioned earlier in the year something about a 5 percent bonus if cities work in a regional plan as a possibility.

Twenty-five percent was a minimum State requirement. This does not mean that they couldn't legislatively give us

30 percent, but this is another point.

The point I am making is that the State is limited even though this is a vast program. I conservatively estimate a $200 million cost here.

MR. STEIN: By the way, you may be right. I think the cities and the industries in the area can do this better. Considering the resources available, this is exactly what we had in mind.

I fully agree with your views, and I think the conferees were persuaded by this.

With the resources the Federal Government is going to devote, the State government is going to devote, and your other problems in the cities, the money that is coming in, the realistic problem of planning and construction in this four months, we would like to have from you a realistic time schedule of your best judgment as to when we can push this forward.

Keep in mind that the State and Federal Governments are agreed on the quality of the waters.

By the way, I would hope you would not disagree with those.

MR. BALDACCI: With the quality? No, I would not.

MR. STEIN: Keep in mind that this is what we want to do.

MR. BALDACCI: Right.

MR. STEIN: We want to do this in the most rapid way. We want to do this in the most equitable way.

We are asking you to come forward in four months with your plans to do this. We would expect that every one of the communities here and the industries have a consulting engineer engaged by this time, so that they can come in and give us these estimates. This is what we are asking.

I think we have made tremendous progress in defining the problem. What I ask you to do is to just meet us with a reasonable program, and let's see if we can get together.

MR. BALDACCI: Well, it was my point, and I hope that it is understood, that I feel the City of Bangor at any rate is meeting you more than half-way.

In answer to our city engineer's question about when could we expect any funds from the State, Mr. Macdonald mentioned 1972. We have an urban renewal plan which is involved in this particular area of interceptor sewers.

MR. STEIN: This is precisely the thing I would hope you and Mr. Macdonald and our regional office would get together on.

If you need us, you know I am just as far away as a telephone, and an airplane trip up here takes two hours.

Any time you have one of these knotty problems, call us. This is why we are here. Anything we can help you with, our people or any other Federal agency, we are ready to do so, but these are the considerations, sir, that we are going to have to handle in the next four months if we are going to come up with the answers.

We hope to work with you on that, and I know Mr. Macdonald will.

MR. BALDACCI: I am sure he will. He has always been cooperative. Of course, he is limited too by the resources.

MR. STEIN: You know, as far as the Federal Government is concerned, now we are going in for $200 million. That sounds like a large sum, but you start splitting that $200 million among the 50 States, by the time it gets down to you it is not very much.

MR. BALDACCI: I was going to ask Mr. Macdonald: Our share in Maine this year is what?

MR. MACDONALD: Based on the $200 million, it is about $1,800,000, or just under $1,800,000.

MR. STEIN: You see, when you talk in so-called astronomical sums on the Federal level, when you begin doing your arithmetic and dividing it and it gets down to where we are going to use the money for spending money, it doesn't seem like too much.

MR. BALDACCI: No, it doesn't.

## Closing Statements

Thank you for allowing me to say something.

MR. STEIN: Of course.

MR. BALDACCI: I would like to add, while I am up, that I think this is a tremendous step forward. This upgrading is something the people of the area have looked forward to for a long while.

MR. STEIN: Thank you very much.

Are there any other comments or questions from anyone in the group?

MR. FOSTER: My name is John Foster. I am the engineer for St. Regis.

I understand the conferees have agreed on the water quality classifications.

I also understand that there was some question of the sulfite liquor situation.

Do I therefore assume that the sulfite concentrations in those three classes of water quality standards were therefore not agreed upon, or not adopted at this time?

MR. STEIN: No. I understood they were.

The question is how much it takes to get the concentration, but I specifically checked that with the technical people when I was outside.

This is not meant as a note of apology or anything, but sometimes they say I am an engineer by osmosis because I have worked with you fellows for twenty-five years. However, these two fellows sitting beside me are engineers and I am a lawyer, and generally I check on these points.

If we get the engineer from the Federal Government and the engineer from the State saying it is okay and it looks kind of reasonable to me, I figure that is pretty good.

That is the way we did it and they have agreed on the concentrations.

If you have any problem, the place to raise this is in the technical committee. What I am saying to you is, in other words, this is not a closed issue here.

Let me again put this out. What we are doing here is dealing with physical facts. We can do anything with a pencil that we want to.

I remember during the World War when we used to have these men qualifying in target practice, we used to qualify more fellows with pencils than you can shake a stick at, but if you do that in this business, the clams up here don't know it and they are going to die, or we may be having something that is too high that is not needed.

If there is a refinement of these facts, we would like to have it, and if you can work it out with the technical committee and come up with something, we will surely have the next session of the conference open to suggestions for modification.

MR. FOSTER: Fine. Thank you.

MR. STEIN: Are there any other questions?

(No response.)

MR. STEIN: If not, again I would like to thank you all for coming.

I think we have made a tremendous amount of progress.

Thank you again. We stand adjourned.

(Whereupon, at 6:06 p.m., an adjournment was taken.)

(The following undated letter was submitted for the record after the Conference adjourned April 20, 1967)

STATE OF MAINE
HOUSE OF REPRESENTATIVES
Augusta

You are witnessing the rape of a great natural resource of the State of Maine and also a business being murdered.

A millionaire has no right to murder a pauper so why should a multi-million dollar business be allowed to murder a small business, and that is what pollution is doing to the clams.

Business should live to-gether. Our rivers, streams shore lines should be protected for the present and also future by any and every means at our disposal.

/s/ Rep. Shepard H. Edwards, Sr.
Stockton Springs, Me.